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ABSTRACT

This curriculum guide on textiles and clothing, covering one of the five content areas of the Energy and Family Curriculum Guide, has been designed to provide learning experiences and identify resources that can be used to develop units of study related to energy usage and conservation. The guide is intended for use in comprehensive courses of home economics as well as specialized courses of the home economics subject matter content areas, especially in the state of Texas. The guide contains four units covering the effect of design elements on thermal comfort, energy management in clothing construction, personal care and energy use, and the role of clothing in energy management/thermal comfort (including fabric selection, relationship of fabric care to energy use, clothing selection for thermal comfort, special clothing requirements for children and the elderly, recycling clothing, and classic fashions versus fads). For each major concept, the guide provides a competency statement, terminal performance objectives, as well as concepts and generalizations linked to specific learning experiences and resources. The guide contains three appendixes. Appendix A contains a bibliography of books, pamphlets, multimedia materials, and other teaching aids. Appendix B contains prepared information sheets, games, bulletin board ideas, check lists, evaluation forms, and transparency masters. Appendix C is a collection of background information that may be helpful to the teacher in using the learning experiences. A glossary completes the curriculum guide. (KC)

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TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

FOREWORD

The level of energy literacy must be raised in our nation. The citizens of the future need to be more knowledgeable about energy and begin now to make wise decisions for the future use of energy. Home Economics Education programs are designed to teach decision making, value clarification, and identification of resources being used by individuals and families in the homes of our nation.

There are things we can do to help citizens of the future to be more knowledgeable about energy and begin to make wise decisions about use of energy. The Energy and the Family Curriculum Guide has been designed to provide learning experiences and identify resources that can be used to develop units of study related to energy usage and conservation. The guide has been prepared for use in comprehensive courses of Home Economics I and Home Economics, II, as well as specialized courses of the Home Economics subject matter content areas. Materials included in the guide are organized into five content areas of Home Economics:

1. Consumer Education
2. Foods and Nutrition
3. Home Management
4. Housing and Home Furnishings
5. Textiles and Clothing

Competency statements and terminal performance objectives were developed for the broad conceptual areas of study. Generalization statements related to key concepts were written opposite appropriate learning experiences. The domains and levels of learning were considered in developing learning experiences. Suggested resources were referred to and can be found in appendices at the end of each content area section. Appendix A contains a bibliography of books, pamphlets, multimedia materials and other teaching materials. Appendix B has prepared information sheets, games, bulletin board ideas, check sheets, evaluation forms and transparency masters. Appendix C is a collection of background information that may be helpful to the teacher in using the learning experiences.

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ENERGY AND THE FAMILY CURRICULUM

T A B L E O F C O N T E N T S

FOREWORD

SCOPE AND SEQUENCE CHART

HOUSING AND HOME FURNISHINGS

Teaching Plans
References
Appendix A
Appendix B
Appendix C
Glossary

FOODS AND NUTRITION

Teaching Plans
References
Appendix A
Appendix B
Appendix C
Glossary

TEXTILES AND CLOTHING

Teaching Plans
References
Appendix A
Appendix B
Appendix C
Glossary

CONSUMER EDUCATION

Teaching Plans
References
Appendix A
Appendix B
Appendix C
Glossary

HOME MANAGEMENT

Teaching Plans
References
Appendix A
Appendix B
Appendix C
Glossary

ACKNOWLEDGEMENTS

SCOPE AND SEQUENCE CHART OF CONCEPTS RELATED TO
ENERGY AND THE FAMILY

HOUSING AND HOME FURNISHINGS

A. Selection of Energy-Efficient Housing
    1. Human needs and values
    2. Mobile homes
    3. Apartments
    4. Townhouses
    5. Single-family dwellings
    6. New types of energy-efficient housing
        a. Solar
        b. Earth
        c. Homes for the future

B. Evaluating a Home for Energy Efficiency
    1. Heat transfer
    2. Air infiltration
    3. Building an energy-efficient home
        a. shape and surface area
        b. house orientation
        c. glass area
        d. landscaping
        e. choice of heating and cooling alternatives
        f. kitchen planning
    4. Retrofitting Existing Homes
        a. Ways to retrofit existing homes
            1. caulking
            2. weatherstripping
            3. foam gaskets
            4. water heating conservation measures
            5. insulation
            6. shading devices
            7. storm or double-paned windows
            8. attic ventilation
        b. Home energy audit

C. Maintaining Thermal Comfort through Interior Design
    1. Design elements inside and outside the home
        a. color
        b. texture
        c. shape and form
    2. Window treatments
    3. Furniture arrangement
    4. Lighting
        a. bulbs
        b. fixtures

FOODS AND NUTRITION

(Home Economics I)

A. Energy Lifestyles

B. Energy Management in Food Preparation
   1. Use and care of food preparation appliances and equipment
   2. Using cookware and bakeware
   3. Food cleanup techniques
      a. Hot water usage
      b. Handwashing vs. automatic dishwashing
      c. Disposal of waste

(Home Economics II)

A. Energy Conservation Practices in Use and Care of Food Preparation Appliances
   1. Conservation awareness
   2. Conventional ovens and surface units
   3. Microwave appliances
   4. Small appliances

B. Planning and Preparing Energy-Efficient Meals
   1. Meal Planning
   2. Oven meals, one-dish meals
   3. Preparation during emergencies
   4. Economics of food production and storage

TEXTILES AND CLOTHING

(Home Economics I)

A. Role of Clothing in Energy Management/Thermal Comfort
   1. Effect of design elements on thermal comfort
      a. Color
      b. Texture
      c. Style
      d. Shape
      e. Accessories

B. Energy Management in Clothing Construction
   1. Management of energy in equipment use
   2. Construction projects
      a. Draft dodgers
      b. Warm sack

C. Personal Care and Energy Use
   1. Consumption of energy by grooming appliances
   2. Energy management habits

(Home Economics II)

A. Role of Clothing in Energy Management/Thermal Comfort
   1. Fabric selection
      a. Fiber content
      b. How fiber is spun
      c. Properties in relation to thermal comfort
   2. Relationship of fabric care to energy use
   3. Clothing Selection for Thermal Comfort
      a. Clo value
      b. Activities
      c. Climate
      d. Accessories
   4. Special Clothing Requirements
      a. Children
      b. Elderly
   5. Recycling Clothing
   6. Classic Fashions vs. Fads

CONSUMER EDUCATION

A. Value of Energy
   1. Uses
   2. Sources

B. Budgeting Energy Use
   1. Lifestyle needs
   2. Cost of operating appliances
   3. Reading the meter
   4. Budgeting plan
   5. Interpreting the utility bill
   6. Customer services available for budgeting and financial assistance
   7. Selection and use of energy-efficient equipment
   8. Energy for transportation

HOME MANAGEMENT

A. Percentage of Home Energy Use

B. Energy Usage of Appliances
   1. Determining wattage
   2. Calculating operating cost

C. Energy Conservation in Home Activities
   1. General conservation practices
   2. Major appliances
   3. Menu planning
   4. Household cleaning appliances
   5. Personal care

D. Managing Transportation

E. Managing Leisure Time

F. Managing Existing Resources

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TEXTILES AND CLOTHING

MAJOR CONCEPT: Thermal Comfort

SUGGESTED FOR: Home Economics I, Textiles and Clothing

COMPETENCY STATEMENT: Recognize the effect of design elements on thermal comfort and energy savings.

TERMINAL PERFORMANCE OBJECTIVES: The student will be able to:

Recognize colors for warmth or coolness.

Classify textured fabrics for warmth or coolness.

Exhibit ways style, shape and accessories add to warmth or coolness.

Identify appropriate clothing to maintain warmth or coolness.

CONCEPTS AND GENERALIZATIONS	LEARNING EXPERIENCES AND RESOURCES
Thermal Comfort	
Thermal comfort is a condition of mind expressing satisfaction with temperature, humidity and air movement.	*Define thermal comfort, clo, style, texture, shape, acccessories, warm and cool colors, bulk, shiny, dull, etc. (See Glossary).
By dressing to keep warmer in winter and cooler in summer, and by setting the thermostat 68°F or lower in the winter and 78°F or higher in the summer, energy savings can be achieved.	Take pretest. View slide presentation from Coats and Clark (available from Gulf States Utilities). See Appendix A. *Hand out and discuss "Energize Your Wardrobe" information sheet. See Appendix B, pages 22-23.
"Clo" is a unit of measurement used to determine overall insulation value of a fabric.	Wrap ice cubes (in plastic bags) with different fabrics. Compare rates and amount at which the cubes melt. The melted water serves as the measurement.
The greater the "clo" value, the greater the thermal insulation value of the garment.	*Conduct experiment, "The Great Hot Sock-O-Late Race." See Appendix B, page 24.
Fabric and clothing insulate by trapping air next to the body.	
Color	
Different colors give the psychological feeling of warmth or coolness.	Review the color wheel. *Collect pictures from magazines or catalogs

The cool colors are blue, green and violet. The warm colors are orange, yellow and red. Dark colors absorb the sun's rays and light colors reflect the sun's rays.	or clothing in warm, cool, light, and dark colors. Discuss the effect of the colors on thermal comfort.
Texture	
Different textured fibers and fabrics give warmth or coolness. Pile, nubby, looped and fuzzy textures give warmth. Several layers of loose-fitting clothing traps air better than one heavy layer. Sheer, smooth and loosely woven textures give coolness. Absorbent fibers allow perspiration to evaporate, thus aiding in keeping cool.	*Develop a swatch box to illustrate psychological energy output of color and textures. See "Sewing Threads", American Home Sewing Association.
Style	
Layering of garments can affect air flow, insulation, and warmth.	Collect pictures of layered clothing and discuss items as means of conserving energy. *Display or model clothing suitable for the "layered look."
Shape of Garments	
The shape of a garment can help insulate the body in cold weather by trapping air or allowing air to circulate, keeping the body cool in warm weather.	Collect pictures of various shapes of clothing and group as contributing to warmth or coolness. *Bring examples of clothing with ribbed shape at wrist, neck or waist; leg warmer, etc. Discuss appropriateness as to thermal content.

Accessories

Accessories can add warmth or coolness, depending on the style.

Have a guest speaker from a department store discuss and demonstrate accessories that contribute to thermal comfort.

*Collect pictures from magazines, catalogs and pattern books showing suitable accessories for thermal comfort.

Using a flannel or bulletin board, have students place accessories on a figure to show warmth.

Construct bulletin board "Accessories Look Great." Use bright-colored poster paper to make the tiger and the tree. Use real accessories illustrating thermal comfort. See Appendix B, page 25.

MAJOR CONCEPT: Energy Management in Clothing Construction

SUGGESTED FOR: Home Economics I, Textiles and Clothing

COMPETENCY STATEMENT: Conserve energy by employing new practices in clothing construction.

TERMINAL PERFORMANCE OBJECTIVES: The student will be able to:

Practice energy conservation through the wise use of electrical clothing construction equipment.

Construct an energy-related project.

CONCEPTS AND GENERALIZATIONS	LEARNING EXPERIENCES AND RESOURCES
Electric Sewing Equipment	
Electric sewing equipment that is properly maintained will operate efficiently.	*Discuss the different ways energy is used in the clothing classroom (sewing machine, steam or dry iron, steamstress, electric scissors, and lighting, etc.). Review manufacturer's use and care guide for maintenance.
Energy can be saved through the wise use of electrical sewing equipment and lighting.	Display electric scissors, demonstrate use and care, and discuss advantages and disadvantages in using. *Distribute fact sheet as informational tool on energy conservation and discuss. See Appendix B, page 26.
Different types of irons are used for different sewing applications.	*Compare wattage used for steamstress and steam or dry iron. Determine which would be the better choice with regard to usage, size of sole plate, etc.
Use of natural light will cut down on electricity.	*Discuss room arrangement for use of natural light to conserve electricity. Discuss location of sewing machine in regard to the window location.
East or west windows may be shaded with solar film or solar screen to make the sewing area more comfortable and decrease air conditioning requirements.	Make suggestions to administration to shade east and west windows or obtain permission to make shading devices for windows.

Construction of Energy-Saving Projects

Constructing simple projects designed to prevent air leakage and provide warmth can save energy and money.

*Student will construct a draft stopper or body sack. See Appendix B, pages 27-29.

MAJOR CONCEPT: Personal Care

SUGGESTED FOR: Home Economics I, Textiles and Clothing

COMPETENCY STATEMENT: Evaluate personal grooming habits for efficient energy use.

TERMINAL PERFORMANCE OBJECTIVES: The student will be able to:

Demonstrate proper usage of grooming appliances for energy conservation.

Choose grooming habits which demonstrate energy conservation.

CONCEPTS AND GENERALIZATIONS	LEARNING EXPERIENCES AND RESOURCES
Grooming Appliances	
Extensive use of electrical grooming and beauty aids can increase energy usage.	*Have students list grooming appliances used in their home and list the watts used for each. Using the hand-outs "How Much Do You Know About Energy Costs," figure the final cost for each appliance. Construct a bulletin board, "Watts Up Doc!" showing grooming appliances and wattage. See Appendix B, page 31.
Habits	
Savings can be made by employing energy-conserving methods when grooming.	*Using grooming tips, students choose an activity: (a) Illustrate on manilla paper or newsprint a grooming conservation tip. (b) Make a word scramble or crossword puzzle. Brainstorm for energy-saving grooming habits and tools such as: shaver vs. blade and hot water; hair dryer vs. air dry; sun lamp vs. out-of-doors. See Appendix C, Teacher Background Information, pages 67-68. Discuss information on hair dryer selection and use. Complete crossword puzzle. See Appendix B, page 32. Divide class into three groups. List all activities conducted in one day which relate to personal care. One group should pantomine the activities using Convenience Products, i.e., electric razor, electric toothbrush, etc. The second group should

pantomine substituting Personal Energy, i.e., towel-drying hair, etc. Third group keeps a summary sheet on how energy can be saved.

*Complete "Shower vs. Bath" experiment. See Appendix B, page 34.

Controlled use of petroleum products can decrease energy consumption.

*Identify petroleum products used in personal grooming and list ways to conserve usage (i.e., shaving creams). See Appendix C, Teacher Background Information, page 67.

MAJOR CONCEPT: Fabric Selection

SUGGESTED FOR: Home Economics II, Textiles and Clothing

COMPETENCY STATEMENT: Evaluate fiber and fabric selection as to thermal comfort.

TERMINAL PERFORMANCE OBJECTIVES: The student will be able to:

Recognize different fabrics.

Differentiate the methods used to make fabrics.

Select fabric for thermal comfort.

CONCEPTS AND GENERALIZATIONS	LEARNING EXPERIENCES AND RESOURCES
Fiber	
There are a wide variety of fiber blends and fabric finishes that help to insulate and ventilate the body.	*Define: (a) fiber; (b) natural fiber; (c) synthetic fiber; (d) non-woven; (e) knit; (f) bonding; (g) fabric; (h) yarn; (i) blend; (j) nap.
The properties of a fiber affect its insulating abilities.	*Show and discuss natural and synthetic fibers and explain the characteristics of each as to thermal comfort. Experiment with different fibers and weaves to see which fabrics are best for winter weather. Wrap ice cubes (in plastic bags) with different fabrics to see the rate at which they melt. The melted water could be measured to make the distinction. Show and explain the three ways fabrics are made: (weaving, knitting, and matting fibers together.) Develop a swatch box collecting examples of different fibers and the different types of fabric. *Discuss fabric tip sheet using examples from swatch box and transparency. See Appendix B, page 36. Have students place four drops of water on different fabric swatches to see how long it takes to absorb the water. Construct bulletin board "Don't Get Snowed Under." Make each snowflake from a different fabric with the name of the fabric written on it. Outline with paper doilies. Suggested samples are nylon, cotton, acrylic, silk, satin, wool, velvet, and rayon.

MAJOR CONCEPT: Clothing Selection for Thermal Comfort

SUGGESTED FOR: Home Economics II, Textiles and Clothing

COMPETENCY STATEMENT: Select clothing for thermal comfort.

TERMINAL PERFORMANCE OBJECTIVES: The student will be able to:

Recognize the different types of clothing necessary for thermal insulation.

Select clothing that will insulate against the cold or provide comfort during the warm weather.

Interpret the term "Clo" value.

Categorize clothing suitable for varied climates.

Recognize that work and recreational activities will determine the design of clothing chosen.

Choose accessories that can be worn for thermal comfort.

CONCEPTS AND GENERALIZATIONS	LEARNING EXPERIENCES AND RESOURCES
Insulation and Protection	
Clothing acts as an insulator in winter and protector in summer.	*Review "Energize Your Wardrobe." See Appendix B, Home Economics I, pages 22-23.
	View slide presentation: "Energy Saving Ideas" or contact a utility company educational person for program on dressing to save energy or loan of slides. See Appendix A.
	Discuss which clothes are worn for protection and how they protect you.
	Demonstrate and discuss single layer, light, woven fabrics which allow considerable heat and moisture exchange through the cloth.
Clo Value	
"Clo" is a unit of measurement used to determine overall insulation value of a fabric.	Define "Clo". See "Thermal Insulation," Appendix B, pages 37-38.
	Using the Keeping Warm Checksheet, assign clo value to each garment students are wearing. Add and compare total clo units for each class member. How do they compare? Discuss reasons for variations of class

	members. (i.e., weather slightly cold, just coming from gym class). See Appendix B, pages 39-40.
Heat and moisture exchange varies with layering and the weave of the fabric.	Have students with different types of clothing state their feelings concerning the the classroom temperature.
Climate	
Clothing requirements will differ according to climate changes.	*Read and discuss handout, "Keeping Cool." See Appendix B, page 41. Class members inventory garments they are presently wearing. What changes in dress would they choose on a summer day or a winter day? Contrast differences between wearing apparel in the South to the North on a given winter day. (Beaumont to New York on January 2).
Activities	
Different activities alter the type of clothing needed.	*List the types of activities that call for specific types of clothing protection in work and play. Collect clothing suited for different activities for a bulletin board. Discuss wearing apparel for the same occupation in cold climate vs. warm climate.
Accessories	
The design of the accessories create warmth or coolness.	*Bring to class accessory items for winter wear which have been or could be made. Display items and discuss sewing skills necessary to complete each item. Choose and construct an accessory item from a pattern catalog or educational material from Coats and Clark. See Appendix A. Students construct a bulletin board entitled "Brighten A Winter Wardrobe." See Appendix B, page 42. Construct an article of clothing such as a down vest, quilted vest (i.e., "Frost Line" or "Calico").

MAJOR CONCEPT: Relationship of Fabric Care to Energy Use.

SUGGESTED FOR: Home Economics II, Textiles and Clothing

COMPETENCY STATEMENT: Recognize that proper fabric care is essential to wise energy use.

TERMINAL PERFORMANCE OBJECTIVES: The student will be able to:

Recognize that different fabrics require different types of care.

Utilize the information found on a care label.

Recognize that energy can be conserved by proper clothing use and care.

Employ the knowledge gained for clothing use and care.

CONCEPTS AND GENERALIZATIONS	LEARNING EXPERIENCES AND RESOURCES
Labels	
Today's clothes are made of a wide variety of fiber blends and fabric finishes which make them easier and less costly to care for.	*Have students develop a swatch box of different materials and labels, using each of the nine care tags. See Appendix B, page 43.
Care labels indicate the proper care necessary to save time, money, and energy.	Construct the bulletin board "Hold on to Labels You Find Hanging Around" using care labels. See Appendix B, page 44.
	Arrange students in nine groups, each group having a different care label. Using "Care Guide for Clothing," have each group discuss the care involved, matching swatches of material with the appropriate care label. See Appendix B, pages 45-47.
	*Discuss information on clothing care. See Appendix B, page 48-51.
	Complete problem-solving activity, "Name That Setting." See Appendix B, page 52.
	Complete the puzzle, "Energy Saving Tips for the Laundry," from Nasco. See Appendix A.
	Plan and present oral report and/or demonstrations on the following topics: 1. Energy Conservation Tips 2. How to Use the Clothes Washer 3. How to Use the Clothes Dryer 4. How to Use the Iron

MAJOR CONCEPT: Special Clothing Requirements

SUGGESTED FOR: Home Economics II, Textiles and Clothing

COMPETENCY STATEMENT: To recognize that special clothing is required by the elderly and the young to maintain thermal comfort.

TERMINAL PERFORMANCE OBJECTIVES: The student will be able to:

Identify physical conditions of children and the elderly that can affect choice of clothing.

Identify clothing suitable for elderly persons and children to maintain thermal comfort.

Construct a craft project for the elderly.

CONCEPTS AND GENERALIZATIONS	LEARNING EXPERIENCES AND RESOURCES
Special Clothing Requirements	
The clothing needs of the elderly, newborn babies, and children will vary according to their health, body systems, and activities.	*Discuss the physical conditions of the elderly and young children that might contribute to the need for special clothing.
A newborn should be checked often for clothing comfort to prevent overheating & chilling since their temperature regulating system is not highly developed.	*Bring samples of infant's clothes to class for a display of clothing for warm weather and clothing for cool weather (baby sacks with feet and hand flaps, sun suits, sweater caps and flapped caps).
Young children should be dressed in lightweight removable layers of clothing.	*Cut from magazines, catalogs, pattern books, etc., pictures of clothing suitable for young children.
	Construct hand puppets from Coats and Clark's "Puppet Pals." Write a script pertaining to wise clothing choices for conserving energy. Present show to elementary school children. (Could be used as an FHA project.) See Appendix A.
Clothing that is appropriate for an active, healthy person is not appropriate for a sedentary, older person in the same weather condition.	Interview a grandparent or other elderly person as to their activities and their clothing needs. Determine his or her methods of dress for warm or cool temperatures.
Older persons may be less active have poor circulation, hardening	Develop an FHA Impact activity such as giving opportunity to crochet a granny square which

of the arteries, lowered resistance to disease, and a lower metabolism rate thereby needing cloting which will give additional warmth.

The body loses heat most quickly through the head, hands, and feet requiring items for coverage.

will be made into an afghan to be given to a nursing home or could be raffled as a money making project.

Brainstorm for ideas for head, hand, and feet protection (night caps, booties, hand mittens and bed sacks).

MAJOR CONCEPT: Recycling Clothing

SUGGESTED FOR: Home Economics II, Textiles and Clothing

COMPETENCY STATEMENT: Estimate value of recycled clothing as a means of saving energy

TERMINAL PERFORMANCE OBJECTIVES: The student will be able to:

Define the term "recycling" as related to clothing.

Identify items which can be recycled.

Identify methods of recycling garments and accessories.

Design a recycled article.

Demonstrate skill in recycling by recycling a garment or an accessory.

CONCEPTS AND GENERALIZATIONS	LEARNING EXPERIENCES AND RESOURCES
Recycling	
Recycling of clothing not only saves money, but it also is a way for consumers to conserve energy and raw materials used in production of apparel.	*Discuss recycling of clothing. See Teacher Background Information - Saving Energy and Devloping Creativity. Appendix C, pages 63-65. Define the terms "recycle" and "throw away society." Discuss how recycling save energy.
All items may not be worth the time, energy, and cost of recycling.	*Examine wardrobe and determine items that could be recycled, using the "Criteria for Recycling" checklist. See Appendix B, page 53. Discuss current fashion trends. Discuss other sources for finding garments for recycling (Goodwill Industries, garage sales, thrift shops). Complete a wardrobe inventory.
There are four major types of recycling projects: simple changes, alteration changes, restyle changes, and major renovations.	*Brainstorm for ways to recycle articles (patches, ruffles, button, dyeing). Use flip chart to list the four major types of recycling project. See Appendix B, pages 54-55.

Simple repair and/or changes to garments can add years of use to clothing.

*Students will do the following repairs their own clothing or samples after instruction from the teacher:

LEVEL 1:
1. Sew on a button
2. Repair a seam
3. Repair crotch area on slacks
4. Shorten or lengthen a hem

LEVEL 2:
1. Replace waistline or sleeve elastic
2. Alter pants legs
3. Repair a pocket
4. Patch a hole
5. Darn a hole
6. Replace a broken zipper

Many people have several items in their closet that can be recycled and used again, or given to someone.

*Students will look through their closet for garments they have not worn for the past year and complete the "Recycling Inventory" except for the 3rd column which will be done in class discussion.

*Recycle a garment or accessory. Use Recycling Worksheet, Appendix B, page 57.

Wear or bring recycled article to class. Describe how it was made and how much it cost.

Construct a bulletin board of ideas collected by students on Recycling Worksheet.

Complete word search "Fashion Finds." See Appendix B, pages 58-61.

Construct bulletin board, "Recycling." Arrange pictures of clothing that could be recycled in the shape of a bicycle wheel.

MAJOR CONCEPT: Classic Fashions vs. Fads

SUGGESTED FOR: Home Economics II, Textiles and Clothing

COMPETENCY STATEMENT: Recognize the energy savings achieved by choosing classic fashions over fads.

TERMINAL PERFORMANCE OBJECTIVES: The student will be able to:

Distinguish between classic fashions and fads.

Develop a wardrobe plan which reflects their energy awareness of classic fashions and fads.

CONCEPTS AND GENERALIZATIONS	LEARNING EXPERIENCES AND RESOURCES
A classic fashion is characterized by simple tailored lines that is fashionable year after year. A fad is exaggerated fashion or style that is popular for a short time.	Discuss difference between a classic and fad and why classics are more energy efficient than fads. Make a collage using pictures from fashion magazines of garments and accessories that are classics and fads. Students will find 5 examples of a classic fashion and 5 examples of a fad and label each. Construct bulletin board from collage.
Energy-conscious consumers recognize the importance of choosing classic fashions instead of fads because a classic remains in style and can be worn for a longer period of time.	*Students will prepare a demonstration showing use in the wardrobe of classic fashion as compared to a current fad.
Fads waste energy because generally the garment is seasonal and when it is discarded, the fabric may not be re-cycled and additional energy is used in sewing or buying a new garment.	Students will analyze their personal wardrobe and classify garments as classics or fads. Also, they will determine what classic items could be added to extend the wardrobe either for school, work, or leisure activities.

APPENDIX A

TEXTILES AND CLOTHING

A P P E N D I X A

References - Clothing and Textiles

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Multimedia Teaching Materials

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APPENDIX B

TEACHING MATERIALS

TEXTILES & CLOTHING

HOME ECONOMICS I

Dressing To Keep Warm

Clothing can be used as an insulator to prevent the loss of body heat to the surrounding cooler air. An insulator works by trapping air in pockets, forming a dead air space. The air cannot move, and therefore, cannot carry heat away from the body. This trapped air keeps us warm. Air can be trapped in the yarn, between layers of fabric or in the weave. Maintaining thickness is important. Fabrics that mat down lose their ability to insulate. Good heat retentive fabrics are fuzzy, springy, thick, flexible, but not necessarily heavy. Clothing does not create heat, but traps air near the body.

Yarns with texture or crimp will trap air within the yarn itself, such as wool. Loosely twisted yarns, such as those in sweaters will, also, trap air. Thick and textured fabrics, such as velour, will also provide warmth.

Tightly twisted yarns that are densely knitted or woven are another category of yarns, but do trap air. This type of fabric has a high wind resistance, which reduces the effect of the wind chill factor.

Several layers of loose fitting clothes trap air better than one heavy layer. However, too many layers can defeat the purpose by flattening the air spaces, thereby actually reducing insulation.

Avoid wearing tightly woven or knitted fabrics of man-made fibers (except rayon) close to the skin. They inhibit the escape of body moisture that make you feel cold and clammy.

Accessories can also serve a purpose of keeping the body warm in addition to improving appearance. Footwear should be closed and have a thick sole. Wear thicker and more textured socks to keep warm. Layers of socks also help, but avoid too many layers. There should be room for your toes to move, or your feet will get cold as circulation is reduced.

Knitted leg warmers are also good for trapping air. Mittens are warmer than gloves because less surface area is exposed.

A large percentage of the body's heat is lost through the head. Therefore, keeping your head warm really does help to keep the rest of your body warm. A hat with a scarf or a hood will protect the head.

The shape or style of the garment can help insulate the body in cold weather. A moderate drape is ideal. Avoid fabrics that cling as this eliminates a layer of warm air. Also avoid stiff fabrics that do not follow the body shape. This allows heat loss to the surrounding cooler air because the air is "pumped out."

Dressing To keep Cool

The choice of clothing for warm weather can aid in keeping cool. Absorbent fibers that allow perspiration to evaporate is the best choice. Choose garments made with a light, open weave, such as gauze or voile.

White or light colored clothes can reduce heat gain; cool colors can make us feel cooler psychologically.

For summer, clothes should be loose fitting, to allow air to circulate next to our bodies. Wear few accessories, as jewelry, belts, and scarves tend to trap heat. Hats reduce heat gain on a sunny day. One should choose open-weave hats with a brim instead of tightly woven or lined hats.

Source: "Energy Saving Ideas", Coats and Clark, and "Sewing Threads", American Home Sewing Association

THE GREAT HOT SOCK-O-LATE RACE

CHALLENGE: Find out which fabric is the best insulator

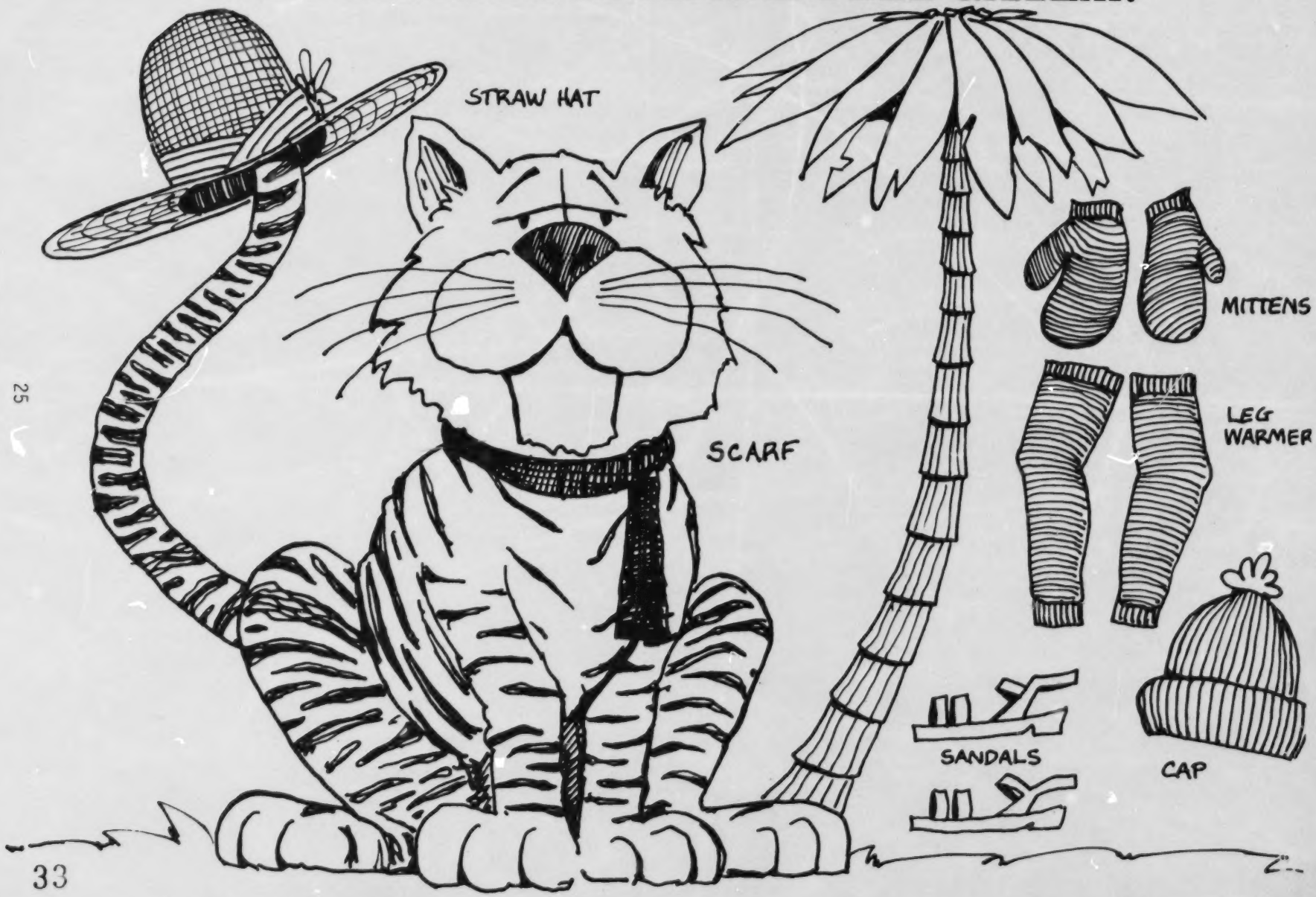
TOOLS:
- Five half-pint size jars and lids
- Enough hot chocolate to make 10 cups
- Milk or water for the mix
- Measuring cup
- Hot plate or stove for heating water or milk
- Thermometers
- 1 nylon stocking
- 1 heavy wool sock
- 3 heavy cotton socks

TASK:

1. Make ten cups of hot chocolate and heat it.
2. Wrap one jar in the nylon stocking. Put one in a single cotton sock. Put two cotton socks on the third one. Put one wool sock on the fourth jar and leave one jar without anything wrapped around it.
3. Fill each jar with 100 ml of hot chocolate.
4. Record the temperature in each jar at the same time.
5. Put lids on each jar.
6. After 10 minutes, remove wraps, open them and check temperature. Record the temperature here:

Container	Temperature Before	Temperature After	Temperature Difference
Nylon stocking			
1 Cotton sock			
2 Cotton socks			
Wool sock			
No wrap			

ACCESSORIES LOOK AND FEEL GRRREAT!



SEWING ENERGY CONSERVATION FACT SHEET

1. Energy can be conserved if the electrical sewing equipment is kept clean and in good repair.

2. Natural light will cut down on the amount of artificial light needed. Re-arrange sewing room, if possible, to utilize the natural light.

3. Replace incandescent lighting with fluorescent lights when possible to save up to four times the energy consumed.

4. Keep all light bulbs, fixtures, windows, and mirrors clean.

5. Turn off machine light when pressing for a long length of time.

6. Press as much as possible at one time and turn the iron off between pressings.

7. Stitch as much as possible before pressing.

8. Select the proper temperature setting for the fabric to reduce repressing.

DRAFT STOPPER

A decorative fabric draft stopper can be made to prevent air leakage around doors and windows. This stopper can be plain or personalized with a name or face. For hanging when not in use, a loop can be attached at one end.

Materials needed:

Fabric for 2 tubes.
Inner Tube: a sturdy tightly woven fabric. Cut 5" wide and the length of the window or door, plus 2".
Outer Tube: a sturdy, firmly woven fabric as denim or calico print. Cut 6" side and the same length as the inner tube. Recycling Idea: Use pant legs to construct tubes).
Loop: 10" piece of rick-rack, twill tape, fabric or elastic.
Heavy Duty Thread
Filler: sand (one pound per foot) or plastic pellets, saw dust, cat litter, old nylons cut into strips, polyester fiber fill, shredded foam.

INSTRUCTIONS:

1. Fold the inner tube material lengthwise, right sides together. Sew a 1" seam along the long edge and one end. Stitch a double seam for strength.

2. Clip corners and turn right side out.

3. Fill this tube with the filler until it is firm.

4. Fold in the raw edges and stitch securely.

5. Fold the outer tube fabric in half, lengthwise, right side together. Place loop inside one end.

6. Sew a 1" seam along long edge and end with the loop.

7. Clip corners and turn right side out.

8. Place the filled inner tube into the outer tube. Fold in raw edges and stitch securely.

Plastic Pellets are available in 100 lb. bags from East-Tex Plastics, Orange, Texas

THE BODY SACK

This "body sack" is easy to make and can be made from quilted fabric or by recycling an old quilt or comforter.

Materials:

60" quilted fabric - measure person from shoulders to feet and add 12" for sitting room for yardage needed.

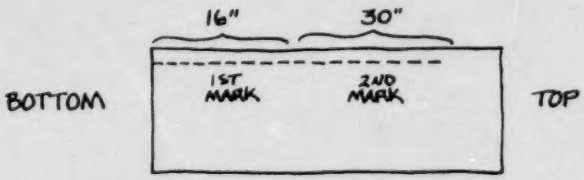
30" heavy duty zipper

Dual Duty thread

6 heavy duty gripper snaps or sew-on snaps. Size 3 or 4

INSTRUCTIONS:

1. Fold the material or quilt in half, lengthwise, right sides together. To mark zipper opening, make two marks along one side 16" from the bottom and 30" from the first mark.

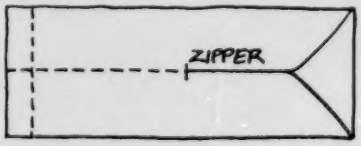


2. Pin long edges together. Stitch a 3/4" seam from bottom to first mark (16"); backtrack. Machine baste to the second mark (30").

3. Press seams open, zig-zag close to the seam edges to finish seams.

4. Install zipper between first and second marks using the centered zipper application.

5. Lay the sack flat on the floor centering the seam. Pin the bottom edges together and stitch closed in a 3/4" double-stitched seam.

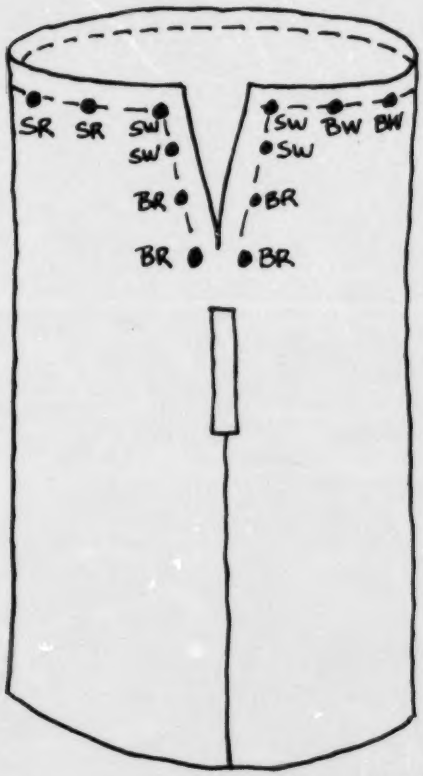


6. Turn the sack right side out.

7. Finish the raw edge at the top and front of the quilted fabric by stitching close to the edge using an average zig-zag stitch. Turn top and front edges under 3/4" to wrong side, mitering the corners. Pin. Topstitch 1/2" from the fold on the right side of the material. (The quilt or comforter will not require this step.)

8. Attach 6 sets of snaps evenly spaced along top and front.

SR = socket half, right side of fabric
SW = socket half, wrong side of fabric
BR = ball half, right side of fabric
BW = ball half, wrong side of fabric



o figure out how much electricity you use per month, you must first figure out what ppliances you use daily, and how long you use each one. Once you know that, check out he example below to find out how to work out the cost of your own energy consumption on a thly basis.

Electric Toothbrush: 1.1 watts. Used three minutes daily.

Hours used per month	x	Wattage	÷	Kilowatts	=	kwh used/month	x	Cost per kwh	=	Final Cost
2	x	1.1	÷	1,000	=	.002	x	.07	=	$.002

3 minutes x 30 (number of days in a month) equals 90 minutes or 1 1/2 hours. Rounded off to the nearest hour, equals two hours.

Wattage should be on appliance or box

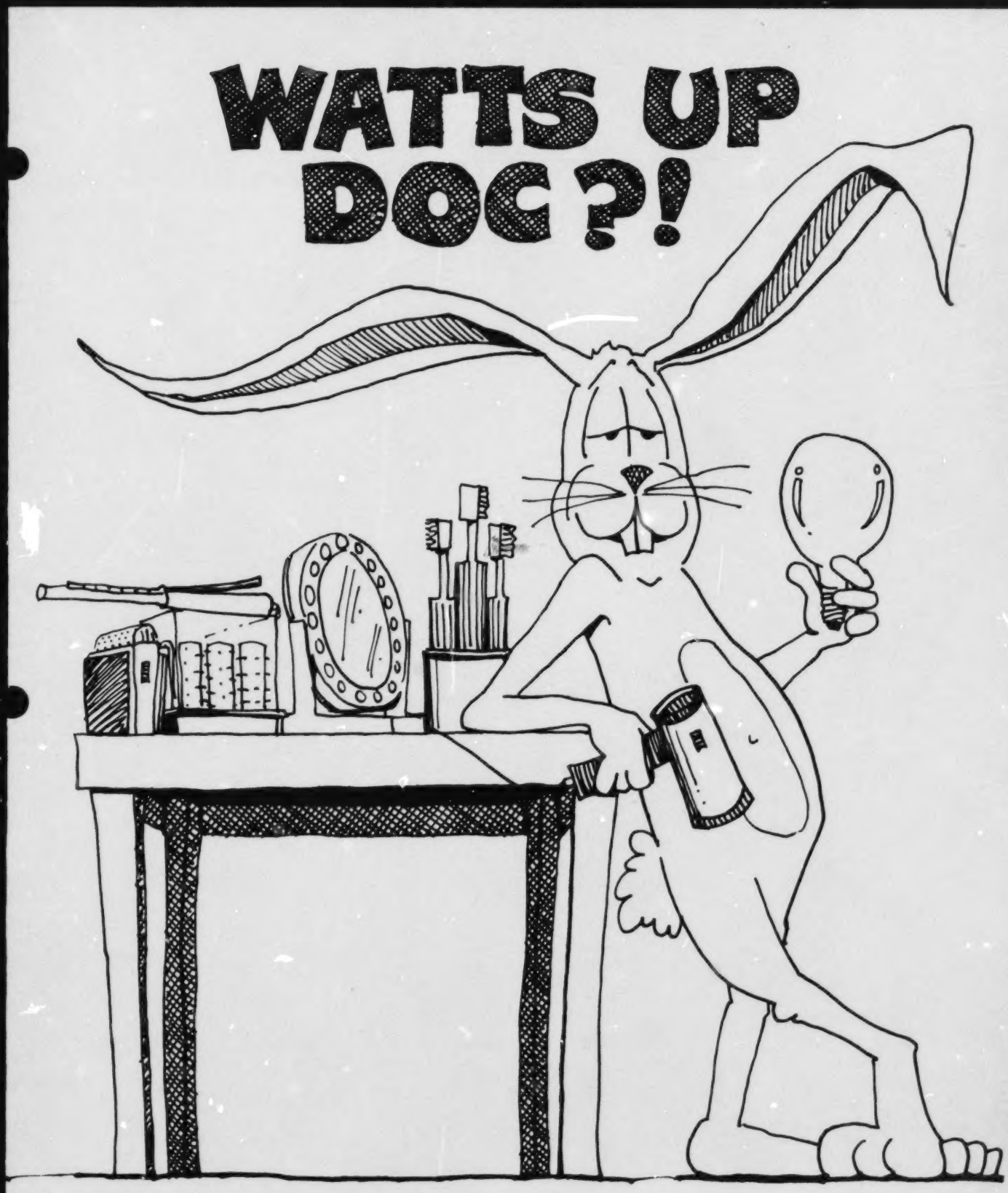
There are 1,000 watts in a kilowatt. Utility companies charge by the kilowatt hour (kwh).

.07 is the national average. Call your utility company for the cost in your area

Next, you try it! Fill in the chart below.

Appliance	Hours used per month	x	Wattage	÷	Kilowatt	=	kwh used/month	x	($.05) cost per kwh	=	Final Cost
1. Blow dryer		x		÷	1,000	=		x		=	
2. Curlers		x		÷	1,000	=		x		=	
3. Curling Iron		x		÷	1,000	=		x		=	
4. Shaver		x		÷	1,000	=		x		=	
5. Toothbrush		x		÷	1,000	=		x		=	
6. Water Pick		x		÷	1,000	=		x		=	
7. Make-Up Mirror		x		÷	1,000	=		x		=	
8. Manicure Set		x		÷	1,000	=		x		=	
9. Facial Mister		x		÷	1,000	=		x		=	
10. Contact Lens Autoclave		x		÷	1,000	=		x		=	
11. Electric Shoe Buffer/Polisher		x		÷	1,000	=		x		=	
12. Hot Lather Dispenser		x		÷	1,000	=		x		=	

ource: Co-Ed. March, 1982. Pg. 18-a.


WATTS UP
DOC?!

FOR THE DRYER BUYER

POINTS TO CONSIDER:

HEAT: Higher heat means faster drying. Lower heat is best for styling or for fine, permed, or color-treated hair. Remember high heat may burn!

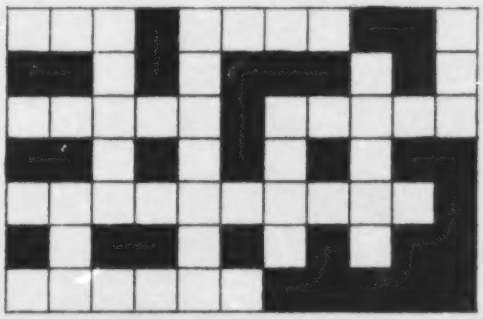
AIRFLOW: For overall drying the more squares or holes for air to flow the better. However, if the flow covers too wide an area, the heated air will be wasted as it is blown past the head. Some dryers have CONCENTRATORS which direct the air for spot drying.

WATTAGE: The amount of power a dryer has is measured in watts. The higher the wattage the hotter the heat and the faster the air flow.

COMFORT: Check the weight and size. Move the dryer around. If it feels heavy it may be tiring to use and difficult to hold while styling. Are the switch placements easy to use? Listen to the noise. Some dryers are shrill sounding and might be annoying.

TYPES AND ATTACHMENTS: Attachments probably cost extra. You may be able to achieve what you need with a blow dryer and the combs and brushes you already own. Hair Styler types usually have less heat and power and come with items like a brush, fine- or wide- toothed combs, pick and curler.

CROSSWORD PUZZLE REVIEW



ACROSS

Start a new 1. ____; give your self a sunshake. Avoid 2. ____-drying your hair. If a dryer is heavy to hold it may be hard to 3. ____your hair. You may have no one but yourself to 4. ____ if you mix water and electricity. A cancer producing substance is known as a 5. ____. Compact dryers with folding handles are good for 6. ____. DOWN A hair A. ____ can save time. At B. ____ people did not C. ____ hair dryers. Avoid using a dryer near D. ____. To save energy, E. ____ with a towel and F. ____-dry your hair before turning on the dryer.

DOES YOUR HOUSE BUZZ WITH THE SOUND OF A HAIR DRYER EACH MORNING?

If you have a dryer or intend to buy one

THINK BEFORE YOU BLOW--
IS IT SAFE?

Recently, hair dryers have been investigated by the Consumer Product Safety Commission (CPSC). Some dryers, especially older models, contain asbestos linings. Asbestos is an insulating material that is considered hazardous. It is known as a carcinogen or cancer producing product.

If you want to know if your dryer has an asbestos lining, you may write and ask the company or the U.S. Consumer Product Safety Commission:

HAIR DRYERS
CPSC
Washington, DC
20207

OTHER SAFETY TIPS:

*Avoid using a hand-held dryer near water such as in the bathroom. You could be electrocuted if you accidentally drop the dryer in the tub or sink

U S E Y O U R H E A D

T O D R Y

Y O U R H A I R

*High heat can burn your hair or scalp.

*Hold a dryer at least six inches from your hair.

*Avoid over-drying.

BE AN ENERGY SAVER...

UNPLUG THE PLUG!

*Think of ways to dry and style your hair with a minimum of power or no power at all! Ask your grandmother, she might know!

*Before turning on the dryer, blot your hair as dry as possible with a towel.

*Air dry your hair, allow extra time before going out.

*Start a new fad, give yourself a SUNSHAKE: Dry and style your hair with a shak in the sun!

Shower vs. Bath

Objective: To demonstrate that a short shower is more energy conserving than a bath, and that lengthy showers waste hot water and energy.

If people took short showers instead of baths or lengthy showers, a lot of energy could be saved. It takes about an ounce of oil (or a cubic foot of gas, or 1/4 kilowatt-hour of electricity) to heat a gallon of water.

Compare the water used for a bath and a shower. Fill your bathtub (at the temperature and depth you like best) and measure the depth with a yardstick (when you are out of the water). Record the Depth: ____ inches. At your next bathing time, take a shower (in the same tub). Keep the drain closed during your shower, but be careful not to overflow the tub. (Do not rush your shower; take your time!) This time, record your bathing time as well as the water depth.

Beginning Time _____ Ending Time _____

Duration of Shower _____ Water Depth _____

If you took a short shower, it should have required only about half as much water as your bath.

Questions:

1. What bathing practice is more conservative for you?

2. What would be the energy impact of taking a 20-minute shower?

3. What are some other ways to conserve energy while bathing?

Suggestions:

1. If your shower was lengthy you may need to measure the depth, empty the tub and then finish your shower and measure again. Add the two depths.

2. Investigate the bathing practices of other members of your family. Who is most conservative?

Source: An Energy Education/Conservation Curriculum Guide for Home Economics Teachers, Oct. 1977, University of Tennessee.

APPENDIX B

TEACHING MATERIALS

TEXTILES & CLOTHING

HOME ECONOMICS II

CLOTHING MATERIAL CHARACTERISTICS

Resistance:	Cotton	Linen	Wool	Silk	Acetate	Triacetate	Acrylic Modacrylic	Nylon	Olefin	Polyester	Rayon
Abrasion		-		-	-	-	-	+	+	+	-
Aging				-					+		
Chemicals			-				+		+		
Friction			-								
Heat	+	+		-		+					
Mildew	-	-			+		+	+		+	-
Moths	+	+	-		+		+	+	+	+	
Perspiration	+	+	-	-				+	+	+	
Pilling			-				-	-	+		
Stains									+	-	
Sunlight	-	-	+	-			+	-	+	+	
Weather									+	-	
Wrinkling	-	-	+	+	-	+	+		+	+	-
Softness	+						+				-
Strength Wet	+			-	-	-	-	+		+	
Dry	+			+	-	-	-	+		+	
Warmth			+				+			+	
Wash & Wear Quality	-		-		-	+	+			+	-
Water Repellency			-								

SOURCE: "Fibers And Fabrics," Consumer Guide From The National Bureau Of Standards

+ = Good To Excellent
- = Fair To Poor

Thermal Insulation

One important factor human beings can use in order to have some control over their comfort in relation to temperature, is in clothing worn. Clothing, of course, provides thermal insulation and also prevents hot or cold air from moving over the body.

Just as there are units of measurement concerning the effectiveness of the insulation used in homes, certain units of measurements can be used to determine the thermal insulation value of clothing. This unit is called the "clo." The greater the "clo" value, the greater the thermal insulation quality. For example, single layer, light, woven fabrics allow considerable heat and moisture exchange through the cloth. Therefore, the overall thermal insulation value of that fabric, as measured in "clo" units, would be of relatively low numerical value. The value might be something of the order of 0.15 to 0.40 "clo" units. However, if several layers of the fabric are worn, heat exchange and moisture evaporation are reduced, and the insulation value would probably be 0.40 to 0.80 "clo" units.

The yardstick used to measure the amount of thermal energy a food yields is the calorie. A part of this energy released from the food consumed is used to maintain the metabolic processes of the body. The metabolic processes, and therefore energy consumption, vary according to such factors as sex, weight, age, and health.

For example, if two people are the same age, sex, and size but one is engaged in more physical exercise than the other, then the more active person will expend more energy in carrying out those activities.

Obviously, different types of fabrics and clothing have varying "clo" values. Winter clothing, for example, that is lined or fur-insulated usually has a "clo" value between 0-8 and 2.0 "clos". It is interesting to note that even the very best quality of arctic winter clothing can insulate no better than 25 times lightweight clothing. These values would range between 2.0 and 4.0 "clos".

During recent years the average indoor clothing "clo" value of men and women's garments has changed from an average of 0.9 "clo" units to those shown in Table 1.

The "clo" values of individual garments range from 0.01 to 0.03 for pantyhose and socks to 0.49 to 0.63 for a light jacket or a warm dress.

By adopting different cold-weather and hot-weather styles of dress, people are able to vary the "clo" value of their clothing as well as the amount of exposed body surface. By repeated exposure to the changing heat of summer or cold of winter, individuals become seasonally or residentially accustomed to the climate and temperature. The process is known as "acclimatization" or "adaptation." Usually, acclimatization requires several days or weeks. It should be obvious that the heat-acclimatized person in warm surroundings will

feel more comfortable than the non-acclimatized individual. On the other hand, the cold acclimatized person will feel more comfortable in cold surroundings than the non-acclimatized person. Therefore, a consideration of acclimatization is just as important as the "clo" value of clothing when one is concerned with the same kind of clothing but with different acclimatization backgrounds may note different degrees of comfort even if they work at adjacent desks.

While the "clo" value of materials is extremely important, other qualities of materials should be considered. For example, wool maintains its "clo" value even when wet. Therefore, this ability to maintain "clo" value makes it an excellent choice for use in cold, wet climates.

Source: Energy Conservation, Navarro College

KEEPING WARM CHECK-SHEET

The chart below is designed to help you find out how comfortably you are dressed for 65°F indoor temperatures.

For each article of clothing that your're wearing, copy the number into the blank space beside it. Then add them to get the total points you have.

- Reading or Relaxing: you'll need a total of 1.6 to 2.0 points.
- Sewing, Playing Cards, Office Work: you'll need 1.2 to 1.5 points.
- Active Work: you'll need .5 to .7 points.

Females	Clo Value		Males	Clo Value	
Underwear:			Underwear:		
bra & panties	.03	____	athletic shirt	.04	____
half slip	.09	____	T-shirt	.06	____
full slip	.13	____	briefs, shorts	.03	____
Light shirt or blouise:			Light Shirt:		
sleeveless, short sleeve	.12	____	short sleeve	.09	____
long sleeves	.13	____	long sleeve	.15	____
Heavy shirt or blouse:			Heavy shirt:		
short lseeve	.17	____	short sleeve	.17	____
long sleeve	.19	____	long sleeve	.19	____
Light dress:			Vest:		
sleeveless, short sleeve	.13	____	light	.10	____
long sleeve	.15	____	heavy	.19	____
Heavy dress:			Trousers:		
sleeveless, short sleeve	.42	____	light	.17	____
long sleeve	.46	____	heavy	.21	____
Light skirt:			Light sweater:		
above knee length	.06	____	sleeveless, short sleeve	.12	____
below knee length	.07	____	long sleeve	.13	____
Heavy skirt:			Heavy sweater:		
above knee length	.14	____	sleeveless, short sleeve	.22	____
below knee length	.15	____	long sleeve	.24	____

Slacks:		
light:	.17	____
heavy:	.29	____
Light sweater:		
sleeveless	.10	____
sleeve	.11	____
Heavy sweater:		
sleeveless	.22	____
sleeve	.24	____
Jacket:		
light	.11	____
heavy	.24	____
Shoes:		
sandals	.01	____
pumps	.03	____
boots	.04	____
Stockings or pantyhose:	.01	____
Scarf or turtleneck	.01	____
YOUR TOTAL:		_____

Jacket:		
light:	.15	____
heavy:	.32	____
Socks:		
ankle length	.03	____
knee length	.07	____
Shoes:		
sandals	.01	____
oxfords	.03	____
boots	.05	____
Tie or turtleneck	.01	____
YOUR TOTAL:		_____

KEEPING COOL

Choose clothing that fits loosely and allows air to flow across the skin. Open collars, large neck openings and sleeveless designs will feel cooler.

Absorbent fibers, such as cotton, rayon and linen take moisture and heat away from the body. Most man-made fibers absorb very little moisture and hold in moist body heat.

Light Colors. Light colors reflect light and feel cooler than dark colors.

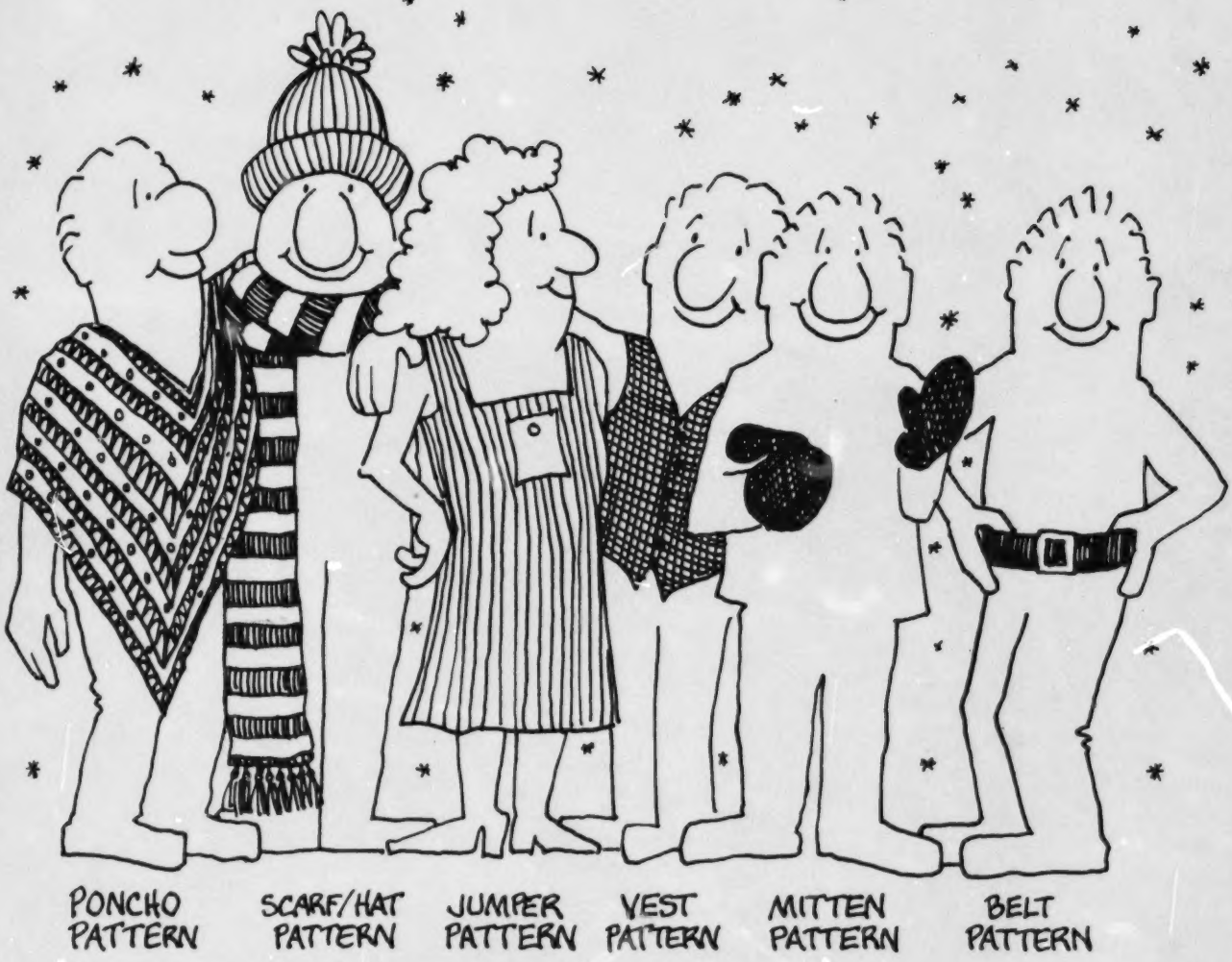
Layers. Eliminate as many layers as possible, including belts, ties and scarves that block air movement.

Shoes. Sandals or open shoes allow heat and perspiration to escape.

The charts* below show how to select your clothes so you can be comfortable at higher temperatures.

If a Woman	She Can Raise Room Temperature	If a Man	He Can Raise Room Temperature
Replaces slacks with with skirt	1.5°F	Replaces heavy trousers with light trousers	.6°F
Replaces long sleeves with short or sleeveless	.2°F	Replaces long sleeves with short sleeves	.8°F
Replaces tightly woven garment with one having open weave	.5°F	Removes jacket	2°F
Removes stockings or pantyhose	.1°F	Removes undershirt	.5°F
Removes full slip	1 °F	Removes tie & open collar	.2°F
Replaces full slip with half slip	.6°F	Replaces knee socks with ankle socks	.6°F
Replaces pumps with sandals	.2°F	Replaces long trousers with Bermuda Shorts	1 °F
TOTAL:	4.1°F	TOTAL:	5.7°F

BRIGHTEN A WINTER WARDROBE

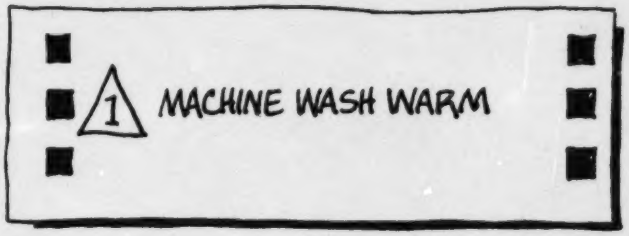


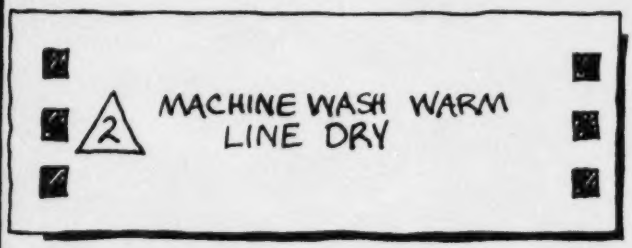
Materials Needed:

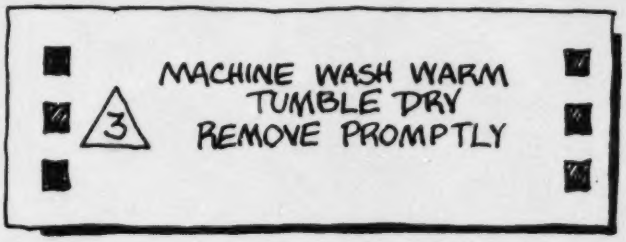
1. Shelf paper or construction paper, light blue.
2. Cotton balls for snow
3. Glue
4. Construction paper for silhouettes, navy blue or black.
5. Swatches of bright plaids, prints, knits, or woolens.
6. Marking pen for lettering, bright color
7. Pattern numbers can come from pattern books, Coats & Clark's pamphlets.

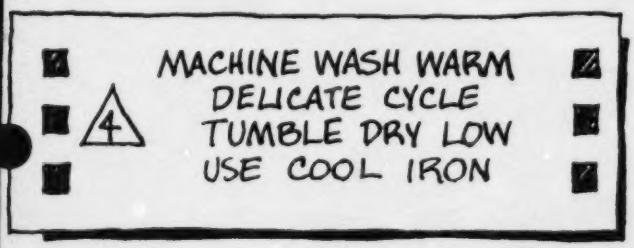
FABRIC CARE LABELS

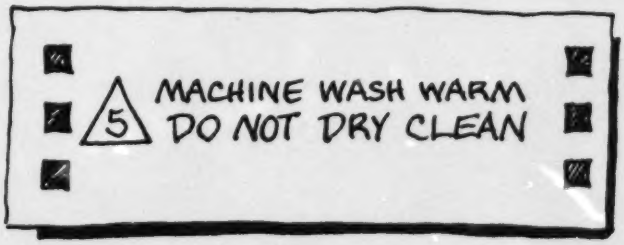
A PERMANENT CARE LABEL GIVES IMPORTANT INFORMATION ABOUT BASIC CARE NEEDS OF THE FABRIC IN GARMET CONSTRUCTION

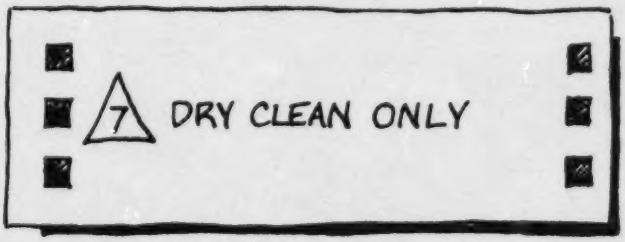


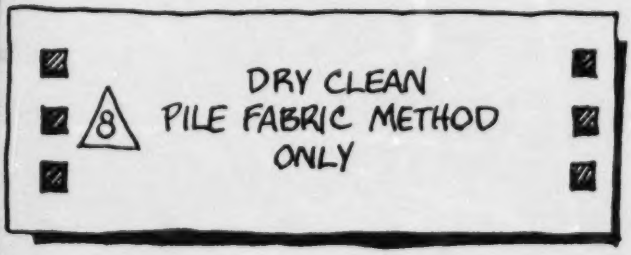


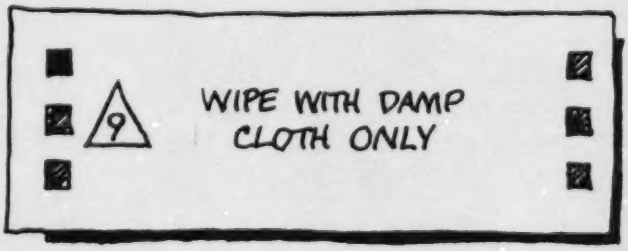




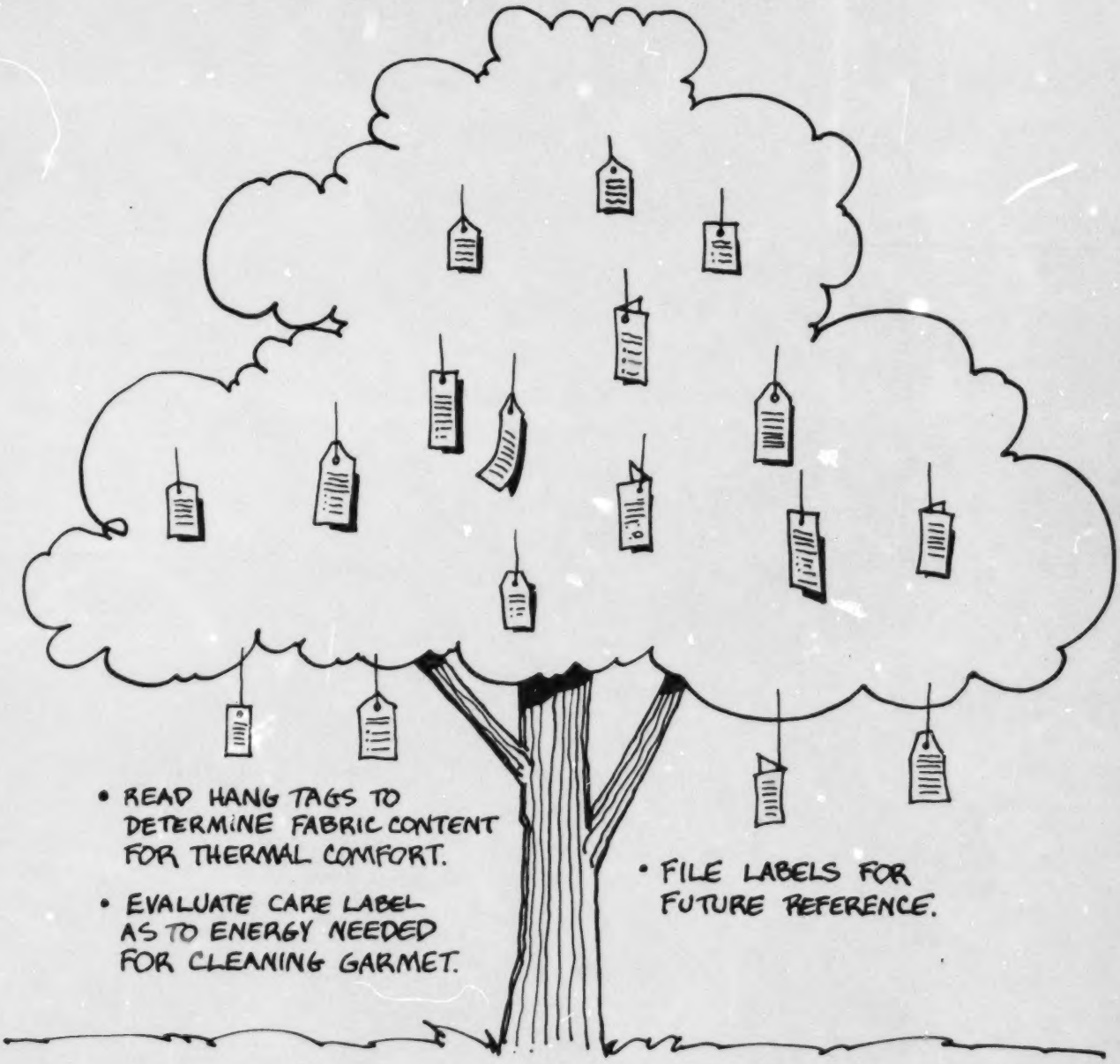








HOLD ON TO LABELS YOU FIND HANGING AROUND!!


• READ HANG TAGS TO DETERMINE FABRIC CONTENT FOR THERMAL COMFORT.
• EVALUATE CARE LABEL AS TO ENERGY NEEDED FOR CLEANING GARMET.
• FILE LABELS FOR FUTURE REFERENCE.

Materials Needed:

Construction paper, or shelf paper background, light green.
Construction paper tree trunk, brown.
Construction paper leaves, medium and dark green.
Assorted hang tags, fabric content labels and care labels.
Marking pin for lettering.

(Adapted from: FORECAST FOR HOME ECONOMICS, December, 1976)

CARE GUIDE FOR CLOTHING

Washing...	When label reads:	it means...
Machine Washable	Washable Machine Washable Machine Wash	Products can be washed, bleached, dried and pressed by any customary method including commerical laundering.
	Home Laundry Only	Products can be washed, bleached, dried and pressed by any customary method EXCEPT commercial laundering.
	No Bleach	Do not use bleach of any kind.
	No Chlorine Bleach	Permits use of all bleaches EXCEPT chlorine bleach.
	No Starch	Do not use starch.
	Cold Wash Cold Setting	Water temperature setting same as cold tap water, up to 75°F.
	Warm Wash Lukewarm Wash Warm Setting	Use warm water 90°-110°F.
	Medium Wash Medium Setting	Use warm water 110°-135°F.
	Hot Wash Hot Setting	Use hot water ("HOT" washing machine setting 130°F or higher)
	Cold Rinse	Use cold water up to 75°F.
	Warm Rinse	Temperature of rinse water from 90° to 110°F.
	No Spin	Remove wash load before final spin phase.
	Delicate Cycle Gentle Cycle	Reduce agitation and time for wash and rinse cycle; otherwise wash by hand.

	Synthetic Cycle Durable-Press Cycle Wash/Wear Cycle Permanent Press Cycle	Cold rinse and short spin cycle.
	Wash Separately	Wash alone or with like colors.
	No Wring No Squeeze No Twist	Important to prevent wrinkles. Hang dry, drip dry or dry flat only. Do not use roller wringer.
Washing.. Non-Machine Methods	Handwash Hand Washable Wash by Hand	Products must be laundered by hand in lukewarm water (90°-110°F) with special care and may be bleached. May be dry cleaned.
	Hand Wash Only	Same as above, but do not dry clean.
	Damp Wipe	Surface-clean only with damp sponge or cloth.
	No Bleach	Do not use bleach of any kind.
	Tumble Dry Machine Dry	Dry in tumble dryer at specified setting: high, medium or low.
	Tumble Dry-No Heat	"Air" setting during tumbling.
Home Drying	Tumble Dry Remove Promptly	Items should be removed immediately to prevent wrinkling.
	Drip Dry	Hang wet with or without hand-shaping or smoothing.
	Hang dry Line Dry	Hang damp in or outdoors.
	Dry Flat	Lay garment on flat surface.
	Block to Dry	Maintain original shape and size while drying.
	Cool Iron	Set iron at lowest temperature setting.

Ironing	Warm Iron	Set iron at medium temperature setting.
	Hot Iron	Set iron at highest temperature setting. For best results in ironing and pressing, use a press cloth between iron and fabric to prevent shine.
	No Iron No Press	Do not iron or press with heat.
	Steam Iron	Iron or press with steam or temperature appropriate for fabric.
	Iron Damp	Dampen garment for best results.
Dry Clean	Dry Clean Only	Dry clean commercially or in self-service stores with any commonly-used organic solvent, including hot tumble drying up to 160°F and steam pressing.
	Professionally Dry Clean Only	Do not use self-service dry cleaning
	No Dry Clean	Use recommended care instructions. No dry cleaning material to be used.

Source: LSU Cooperative Extension Service

CLOTHING CARE

Home care of clothing involves the use of appliances which consume electricity and hot water. The largest contribution to energy conservation in the home could be realized by switching from hot to cold water washing cycles; this could amount to an annual savings of about nine dollars per household or about 10 percent of the energy used to heat water. A savings equivalent of 100,000 barrels per day (BPD) of oil could be achieved by the nation if cold water washing were adopted. In the U.S., the average hot water temperature is 130°F; warm water temperature is 105°F; and cold water temperature is around 60°F. Water temperatures currently used in home laundering in the U.S. are: hot water, 30 percent; warm water, 50 percent; and cold water, 20 percent.

There are a number of energy conserving features to look for when purchasing appliances such as washers, dryers, and irons:

1. Look for certification seals, such as Underwriters' Laboratories (UL) and Asosciation of Home Appliance Manufacturers (AHAM):

2. Inquire about the amount of hot water and electricity required to complete normal cycle; there are differences in these respects among the washers on the market.

3. A "soak cycle" feature on a clothes washer is an energy saver. It can be used to loosen stubborn stains so heavily soiled clothes need be washed just once.

4. Design of the washer should permit a partial filling of the tub when less than a full load of wash is to be done.

5. Select a washer with adjustable water controls which allow the user to select the water level to match the size of the load.

6. Many washers have adjustable wash-time controls. By matching wash time to load and soil levels, washing longer than necessary can be avoided.

7. The automatic controls on the washer should permit rinsing to be performed in cold water regardless of the temperature selected for the wash.

8. Suds-saver features allow for the reuse of hot and warm water for several loads. These features permit the use of the warm water form the first load for the washing of the second load.

9. Permanent press cycles on both the washer and dryer use lower temperatures than regular cycles and are especially designed to avoid wrinkling so no ironing is necessary.

10. Look for the proper capacity washer and dryer for your specific needs. Large capacity washers and dryers can handle in one load what small ones must do in two and so save energy. However, an underloaded large washer or dryer will waste energy. Capacity is indicated in terms of pounds of clothes.

11. Dryers should be equipped with a buzzer to indicate when clothes are dry so they can be removed before wrinkles are set.

12. The most accurate type of control for dryers is a moisture sensor. It automatically shuts off when clothes are properly dry.

13. An "air fluff" cycle dries without heat. This can be a big advantage in drying delicate fabrics or feather pillows.

14. A "damp dry" setting on the dryer saves energy by reducing drying time and allowing clothes to be removed when ready for ironing.

15. Look for an iron with fabric settings to insure the proper temperature to avoid wasting energy and scorching.

The use and maintenance practices for washers, dryers, and irons should be directed toward the conservation of electricity and hot water. This involves an attempt to reduce operation times and temperature settings to a minimum without sacrificing effectivness. The units must be properly maintained to avoid operation inefficiencies which will require more eneryg to do an effective job. The following operation, maintenance and practice tips will help reduce the energy demand when laundering:

1. Read the manuals for your washer, dryer, and iron and take advantage of energy saving instructions. Read maintenance instrucitons and follow them carefully.

2. The major cost in washing clothes is the hot water used. The more wash that can be done with cold or warm water, the more energy that can be saved. Always rinse with cold water. Sort clothes according to fabric and degree of soil since permanent press and washable woolens and lightly soild clothing can be washed in cold water. There are a number of cold water detergents on the market, many with germicides which take the place of hot water for killing bacteria. If cold water is not effective, then use warm water for washing and cold water for rinsing. The best balance between energy conservation and cleaning is to wash in water above 80°F (27°C) for normal soil conditions. The closest setting on the washer is warm, which is approximately 95°F (35°C).

3. It is a good idea to locate the washer near the water heater to minimize heat loss in pipes. And be certain there are no leaks between water heater and washer.

4. Both the washer and dryer must be properly loaded. Collect laundry until there is a full load. Automatic washers and dryers go through the same cycle for a full load or a single item, unless they are equipped with a small load or mini-load cycle. Be careful not to overload. Overloading reduces the cleaning action of the washer and the drying action of the dryer as well as resulting in more abrasion, lint, and wrinkles. Varying the size of the garments in a full load allows for freer circulation in washer and dryer.

5. Follow detergent instructions carefully so that you do not make too many suds. Too many suds reduces cleansing action.

6. Use the special features on appliances to conserve energy i.e., short cycles, mini-load cycles, cold water rinse, suds-savers, soak cycles, timers, moisture sensors, selection controls.

7. Use the appropriate water level, water temperature, washing, time, drying temperature, and drying time for the type and size laundry load. Separate drying loads into heavy and light weight items. Since the lighter ones take less time to dry, the dryer doesn't have to be on as long.

8. Dryers should be installed in a warm place to reduce the amount of heat needed; i.e., avoid placing dryers in unheated areas such as garage and utility rooms.

9. Keep the lint screen clean in the dryer, remove lint after each load. If the washer does not clean its lint filter automatically, you must clean it after each load. Check and clean the dryer exhaust on the outside of the house occasionally.

10. Dry clothes in consecutive loads to take advantage of the heat from previous loads. Small items may be dried on the stored heat from a previous load.

11. With the use of an old-fashioned clothes line (a practical solar energy device!), the energy consumption required for drying can be eliminated. Sun-drying also has a germicidal effect, adds needed humidity in the winter or in arid climates, and makes linens smell fresher.

12. Damp drying saves energy and prepares clothes for ironing without sprinkling. Natural fibers such as cotton, wool, or linen need a small amount of moisture to avoid feeling harsh and becoming wrinkled. Overdried clothes are difficult to iron.

13. By removing clothing and linens promptly from the dryer and folding or hanging them carefully, many items will require little or no ironing. Some dryers are equipped for several minutes of "fluff only" with intermittent signals as a reminder to remove permanent press items before wrinkles set.

14. Hand irons consume as much energy as ten 100-watt light bulbs. Time can be reduced by ironing large batches of clothes at one time, avoiding heating up the iron several times, ironing fabrics which require low temperatures during warm-up and cool-down periods, and turning off the iron when interrupted for any length of time and when finished.

15. Use the lowest iron temperature required for each fabric. For example, synthetics require the lowest temperature; silk and wool require medium temperature; and cotton and linen require high temperature. Matching the temperature setting to the fabric prevents scorching or underpressing.

OTHER

Change to play clothes when you come home from school or work.

Hang wet towels to dry after bathing so they may be used again.

Hang or fold clothes that can be worn again without laundering.

Pre-treat stains as soon as possible.

Follow manufacturer's suggested methods for cleaning.

Consider gasoline expense when dry cleaning.

Consider ironing as an added expense.

Protect clothes from stains when cooking, eating or working on messy projects.

"Name That Setting"

This activity will be used as a class problem solving activity on clothing care for energy conservation by individual students or by group work. A class discussion will follow, evaluating the selections made.

1. Student will draw on construction paper and cut out the following equipment, laundry supplies and clothing.

   (a) washing machine with the settings of:

warm	Hot	Hot	Warm	Cold	High
warm	warm	Cold	Cold	Cold	Medium
					Low

   (b) dryer:
   AIR, TIMED, DELICATE, PERMANENT PRESS

   (c) clothes line

   (d) detergent: powder & liquid

   (e) bleach: chlorine & oxygen

   (f) fabric softner: for use in dryer, in rinse and in combination with detergent

   (g) launderable articles found in the home such as:

towels	dresses	undergarments	
sheets	slacks	socks	hose
tennis shoes	blue jeans	skirts	etc:

2. Sort the articles as to washer loads considering colors, load size, garment finish, etc.

3. Taking each load place the clothes on the washing machine, selecting the proper water level and temperature setting.

4. Decide the type of detergent to use; whether to use bleach, softner, etc.

5. Student chooses to line dry or machine dry. Choose proper dryer setting for each load.

6. Each person or group will explain choices made and a discussion will conclude activity.

CRITERIA FOR RECYCLING

The unworn clothing hanging in your closet might be made into useable items. Below is a checklist that will help you decide whether the garment is recyclable.

___Is the garment near your size so that it will fit when altered?

___Is the fabric worn, or torn, so badly that it will need a lot of repair?

___Can old hemline marks be removed or covered in some way?

___Can the present design of garment be cut into a new design?

___Can garments of the same fabric be cut patchwork style to construct a new garment?

___Will the fabrics and notions needed to recycle garment cost more than the garment is worth?

___Is time available for reconstruction?

___Do you have the skill for recycling the garment or can you attain such a skill?

___Will the recycled garment be worn and enjoyed?

___Is the fabric badly faded or stained, especially where it shows the most?

___Will needle marks show on the fabric when stitching lines are changed?

MAJOR TYPES OF RECYCLING PROJECTS

Simple Changes. Little sewing skill or experience is required. Major needs are ideas, some time, and some cash outlay.

- purchase or construction of a new blouse to make a sweater or jacket and skirt stylishly companionable.
- addition of current accessories to update garments.
- simple mending that would make an article wearable.
- new buttons, addition of trim or a change of sleeve length from long to short can increase wear-life of a garment.

Alteration Changes. Sewing skill and an understanding of fit are helpful for these changes. If the individual has these abilities, the major investment will be in ideas and time. Cash outlay is usually minimal.

- length of garment adjusted to make it more wearable and fashionable.
- width of garment areas changed by increasing or decreasing seam widths and darts, adding panels of fabric, etc.
- change of neckline and armseye areas to make garment fit or to attain more attractive style lines.

Restyle Changes. Ideas and sewing skill are major requirements for these changes. Some purchases of notions and fabrics may be desired. This type of recycling involves changing part of a garment.

- make a dress into a jumper.
- shorten a coat into a jacket.
- Add or eliminate design details or change style for new appearance.

Major Renovation. Experience and advanced sewing skill are needed for success with this type of recycling. Usually, the greatest resources required are time, ideas and patience.

- Make-over of a garment that is outgrown, out of style, or of a wrong color for another individual.
- Construction of a garment from fabric of 2 or more garments to make a new garment or outfit.

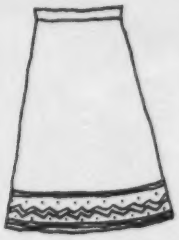
Some articles may not be usable for renovation to a wearable garment. Before these items are destroyed, consider whether:

- buttons, zippers, or trims could be removed for further use.
- fabric could be used for making patchwork, soft fabric sculptures or jewelry, wall hangings, braided rugs or other creative uses.
- school or local theatre groups might have use for articles as costumes, or children would enjoy them for "dress-up."

"ENERGY SAVING IN DEVELOPING CREATIVITY," Illinois Teacher, Jan./Feb., 1979.

School or local theatre groups might have use for articles as costumes, or children would enjoy them for "dress-up".

Lengthen skirt with ruffled embroidery trim or tiers of gathered fabric



If old hemline shows when you let a hem down, cover line with trim or decorative stitches.

Make a skirt from man's trousers.

Make a waist-length jacket from a long jacket.

Create a tank top from a tee-shirt.

Make a pullover sweater into a cardigan.

RECYCLING INVENTORY

Type of Garment	Why Garment Hasn't Been Worn	Changes That Could Be Made

RECYCLING WORKSHEET

1. Collect some ideas for recycling clothes or other articles into usable articles (ex. patchwork pillow, vest, skirt from slacks, t-shirts from shirt).

2. Describe your plan for the recycling project. List the equipment and materials needed.

3. Take a picture of the article before you begin recycling.

4. List the steps necessary for your project.

5. Keep a cost sheet on your project.

6. Take a picture of your finished project.

7. Evaluate the project.

	Estimate	Actual
Present value of "old" garment, if any	$_____	$_____
Supplies Needed:		
Fabric Cost	$_____	$_____
Notions: zipper	$_____	$_____
buttons	$_____	$_____
snaps	$_____	$_____
thread	$_____	$_____
seam tape	$_____	$_____
trim	$_____	$_____
elastic	$_____	$_____
other:_____	$_____	$_____
_____	$_____	$_____
Pattern	$_____	$_____
Total Cost of Supplies	$_____	$_____
Time Spent:_____hours x $_____per hr. =		$_____
Total Cost of Recycling Project		$_____

Type of Garment Worked On _____

What I Did to Change Garment _____

Finished Product _____

Probable Cost of New Garment Similar to Finished Product	$_____
Less Cost of Recycling Project	$_____
Amount Saved by Recycling	$_____

FASHION FINDS

O C A G E S
O C S P P M N B T S
W A L T R P G K T N E L S
C E C G N L C E L E R B D
T P L I O Z I P P E R S X N V
O S P H I N Q U E R B E R A L
Y O K E R R O U N I L L G Q B W E
R R L I Y S T O E P C O L L A R I C L
L O N R H E A T R D R U M G S O O N E
R R L Y T S N P V E S T S H R O L M D R L
H T S E N Y N A S D B A T G O I A P H I R
T N E S S B U T T O N S A R L I Y L U B L
Y N S I T M C D F O L T R A D E D C B M
B T M P A A H C L O M I A R N R Z A O O
W O R B L X E E V R C H A I N M N S N R
F I R Q U S H O R T S P L N A C E L P
R I R K E R P A T C H N I S L A O
M O R L S T P B A M I T L M A R D
O D Y E P L O O H D B R K C L T L
P I N O I P L E R O E A R R I N G
R L V R I M P H R L O O T G U
H R O O M D I L T C S S L
P L R U F F L E L P G
C E C G N I L O M

Fill in the word to complete the recycling statement, then find and circle the word above. A clue is given at the end of each sentence giving the number of letters in each word.

1. Sew on all missing _____.(7)

2. Add _____ to worn-out elbows of sweaters, jackets or coats.(7)

3. To lengthen a skirt add a _____.(6)

4. Lengthen or shorten a ___ to re-vitalize a garment.(3)

5. A little extra scrubbing or bleaching will remove _____ from many garments.(6)

6. If a stain cannot be removed ___ your garment a dark color such as navy, brown or wine.(3)

7. Stitch an _____ (8) or _____ to cover a hole.(5)

8. Cut the _____ off a shirt to create the new band-collar shirt look.(6)

9. Transform last year's clutch bag into a shoulder bag by adding a _____ strap.(5)

10. Remove the ____ and belt loops from a jacket for the new boxy look.(4)

11. Wear summer T-shirts and _____ them with blouses and shirts.(5)

12. Swap or _____ clothes that no longer fit with friends or class members.(5)

13. Make a stickpin by glueing a T-pin on a single _____.(7)

14. Add a ____ to the top of a skirt to lengthen it.(4)

15. Add several _____ together in an interesting geometric pattern to lengthen a dress, skirt or pants.(5)

16. When pants are too short, cut off to wear as _____ or knee length pants.(6)

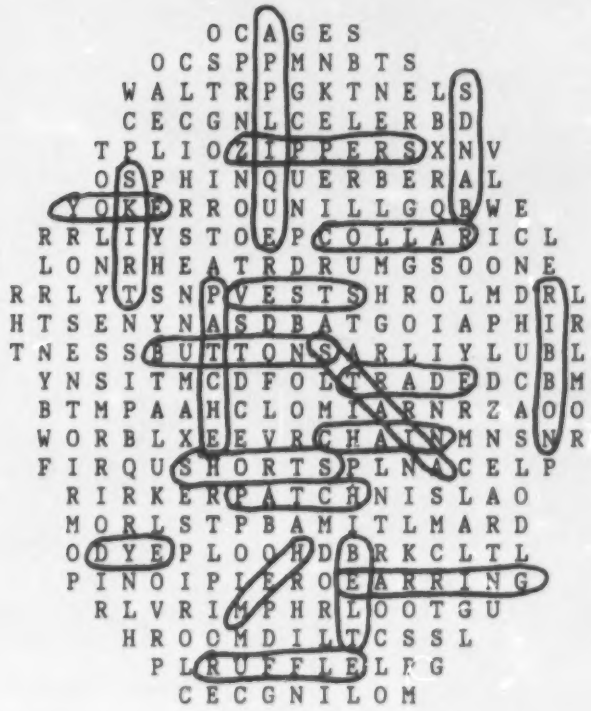
17. Make a _____ by cutting the waist from the dress and adding a band.(5)

18. Repair or replace _____ in slacks and skirts.(7)

19. _____ to be worn over skirts can be made from patchwork scraps or worn knit shirts.(5)

20 _____ or trim can be added to cover hem marks.(6)

FASHION FINDS



Fill in the word to complete the recycling statement, then find and circle the work above. A clue is given at the end of each sentence giving the number of letters in each word.

1. Sew on all missing _____.(7)
2. Add _____ to worn-out elbows of sweaters, jackets or coats.(7)
3. To lengthen a skirt add a _____.(6)
4. Lengthen or shorten a _____ to re-vitalize a garment.(3)
5. A little extra scrubbing or bleaching will remove _____ from many garments.(6)
6. If a stain cannot be removed _____ your garment a dark color such as navy, brown or wine.(3)
7. Stitch an _____ (8) or _____ to cover a hole.(5)
8. Cut the _____ off a shirt to create the new band-collar shirt look.(6)
9. Transform last year's clutch bag into a should bag by adding a _____ strap.(5)

10. Remove the belt and belt loops from a jacket for the new boxy look.(4)

11. Wear summer T-shirts and layer them with blouses and shirts.(5)

12. Swap or trade clothes that no longer fit with friends or class members.(5)

13. Make a stickpin by glueing a T-pin on a single earring.(7)

14. Add a yoke to the top of a skirt to lengthen it.(4)

15. Add several bands together in an interesting geometric pattern to lengthen a dress, skirt or pants.(5)

16. When pants are too short, cut off to wear as shorts or knee length pants.(6)

17. Make a skirt by cutting the waist from the dress and adding a band.(5)

18. Repair or replace zippers in slacks and skirts.(7)

19. Vests to be worn over skirts can be made from patchwork scraps or worn knit shirts.(5)

20 Ribbon or trim can be added to cover hem marks.(6)

APPENDIX C

TEACHER BACKGROUND INFORMATION

TEXTILES AND CLOTHING

SAVING ENERGY AND DEVELOPING CREATIVITY IN RECYCLING CLOTHING

One of the challenges to professional home economists in recent decades has been to help our students or clientele, whether youth or adults, to be aware of and understand new technological developments in our area. The "what's new" topics seem to have a certain appeal to the teacher and the learner. In fact, U.S. consumers in general have become very accustomed to expecting a constant availability of new products in the marketplace. The technological boom and economic situation created what some refer to as a "throw-away society" in our country. Product purchases, such as clothing and appliances, are made simply because it is new on market or in an effort to keep up with what a friend or relative has bought. Little thought may be given to the benefit in realtion to cost to the individual or family. Is it needed to repalce an item that is no longer usable? How frequently will it be use and does frequency of use justify cost? What can be done with the item that the new purchse will replace? Answers to these questions can have a great impact on individual, national, and world resources. As we read about such concerns as inflation, availability and use of raw materials, and protection of the environment in our country, what can we as Home Economists do to help our students or clientele to make better use of resources? An area that is natural for our classes or programs is extending use or wear-life of textile products.

Technology has provided us with fabrics that have great durability. We often grow tired of or outgrow clothing long before it is actually worn out. Quite often an item of clothing may not be worn simply because it is outdated in fashion. Many of these garments are disposed of with little thought or concern about whether or how the use-life of the garment might be extended.

Recycling of clothing not only saves money, but it also is a way for consumers to conserve energy and raw materials used in production of apparel. Concern about these factors has caused the textile industry to embark on a "recycle and save" theme. Methods have been developed to recycle synthetic fiber waste materials, waste water, heat, and chemicals. All of these processes are aimed toward conserving energy, water, and raw materials and controlling environmental pollutants.

Current interest in antiques, heritage, and fashion adaptations from the past has removed some of the stigma many people have had about old things. However, there are a number of adults and youth who lack the incentive and/or desire to make use of the "recyclables" available to them.

A clothing unit or program on recycling apparel is a good way to teach and develop the creative potential in every student. Unfortunately, due to lack of encouragement and development, some individuals'creative abilities never emerge. The challenge to the teacher is to provide opportunities that inspire and allow the student--whether teen or adult, male or female--to engage in the process of creativity. Learning to see and gain confidence in use of color, texture, shape, and form are part of this creative process. Fabrics and garments no longer worn provide a perfect outlet for experimentation with these elements of design. In some situations, the

process and self-confidence achieved by the student may be of grater importance that the final product of the recycling project.

To inspire the students, a teacher or leader might select several clothing items from his/her family member's and/or friend's wardrobe that are not currently being worn and use these garments to discuss such area as:

1. Where to find garments to recycle (closets, garage, or rummage sales, secondhand and thrift shops).

2. Reasons for recycling.

3. How to decide whether garment or fabric can be or is worth being recycled.

4. What is involved in recycling:

   - creativity
   - sewing skill
   - time
   - cost

5. How can the article that cannot be made into a wearable be used?

Suggest that individuals look through their closet or other family member's closet for clothing items that they have not worn during the past year. A recycling inventory sheet may be a helpful aid. The inventory sheet format might include the following:

Type of Garment	Why Garment Hasn't Been Worn	Changes That Could Be Made

The first two columns could be filled in at home and the third column during a class session. The class could be reminded of other sources for acquiring garments for recycling if they do not find suitable articles in their or family wardrobes.

Each person could bring to class 1 or 2 items they list on the recycling inventory or have acquired from other sources. Resource materials (such as magazines, pattern catalogs) and garments that have been recycled could be used for inspiration with the projects. Tracings of silhouettes similar to the garment to be recycled can be made from pictures in magazines, catalogs and newspapers. To experiment with ideas, students can sketch possible changes on the traced silhouettes. The creativity of individuals is often inpsired by others. Groups of 3 or 4 persons working together on recycling ideas may provide a broader range of possibilities for use of each garment.

"Recycling cost sheets" for the recycled garments can be used to introduce the topic to group. A sample cost sheet is included on page 191. The cost sheet could be used in planning stages for students to estimate what

cash outlay will be involved in the proposed garment changes. An estimate of costs can help the student decide which alternative for recycling a garment is the best decision. One aspect of this decision is economics. Actual costs of notions and materials can be recorded on the cost sheet when the project is completed. The sample sheet also includes time cost for recycling the garment. Local hourly wage level for the age group when employed in comparable skill jobs can be used as a guide for determining time cost of student project.

Alteration of garments is one of the most frequently needed and used methods of making non-wearables into wearables. A class or FHA chapter or other groups with advanced sewing skills and knowledge of fitting could open an "alternation shop" as a special project. Sources for garments to alter might include faculty, other students, or student's family members. This project would provide a wide range of alteration experiences that could be applied immediately, as well as in the future, to personal and family clothing needs. In addition, alteration skills are very salable. Persons with this skill can find employment in a variety of types of clothing stores or in dry cleaning establishments. Or, they could start an alteration business in their home.

An exhibit or style show can provide an opportunity for students to share with others what they have learned. Color slides or prints of the garments before they are recycled can help tell the story. Color prints of the "before" with the "after" recycling changes would provide a series of eye-catching exhibits. Slides of the original garments could be flashed on a screen as the recycled garments are modeled. Information from the inventory and cost sheets would provide commentary for the style show. In addition, the slides would be a very good "ideas for recycling" resource to use with future classes or groups. If a reasonable estimate of the energy saved by all the projects in the show could be given (in terms of gallons of gasoline, for example), that aspect of recycling could be given greater emphasis.

The sources of materials for recycling are limited only by what each person sees when she/he looks at a garment or a fabric. Personal resources of time, skill and money are usually needed but often can be acquired or adapted more readily than resources necessary to purchase new garments. Through recycling of textile products, consumers can make a genuine contribution toward the efforts to conserve the use of raw materials and control environmental pollution. And, finally, a recycling unit offers many opportunities for teaching principles, values and skills important in making decision about individual and family clothing needs.

Source: Marjorie Sohn, Illinois Teacher, pp. 189-190., Jan./Feb. 1979.

BATHING

The National Bureau of Standards (NBS) reports that bathing accounts for 42 percent of the daily use of hot water in the home. Approximately 88 gallons of water per day are consumed by the average family in the United States for bathing and the average point-of-use temperature is 105°F. The energy consumed for hot water used when bathing may be reduced through technology and frugal consumer practices.

The average shower uses eight gallons of water per minute. There are showerhead flow control devices which can cut the flow to three gallons of water per minute. The reduced flow rate is compensated by increased pressure to insure effectiveness. By installing a flow restrictor or a new showerhead with a smaller flow rate and holding the duration of two showers to 5 minutes each, a reduction of 30 gallons per day of hot water could be realized.

Many devices are available to limit the flow of water from showerheads. A simple washer is the least expensive, but more elaborate flow restrictors are available which maintain a constant flow. (If line pressure drops, the device opens wider to maintain a constant flow.)

It is somewhat impractical to expect people to reduce the number or temperature of their baths or showers significantly, but they should be encouraged to reduce the amount of water they use. A significant savings could be achieved if consumers would take short showers as opposed to lengthy showers or tub baths. A short shower uses less hot water, thus less energy.

A full bathtub requires about 36 gallons of water. The minimum water level for a bath (to allow for proper rinsing) is about 10 to 20 gallons. Taking a shower with the water running constantly requires eight gallons per minute without a flow control device. That means 40 gallons for a five minute shower up to 160 gallons for a twenty minute shower. A flow restrictor can reduce the water for showering to 15 gallons for a five minute shower. By turning the water off while soaping up and using water only for wetting down and rinsing off, only about 4 gallons will be needed!

The use of hot water at the bathroom lavatory is another source of energy consumption. The typical lavatory faucet permits a flow of five gallons per minute when wide open. With the use of an aerator or spray tap, the flow is reduced (mixing air with water makes the flow seem larger than it is). Aerators can reduce water consumption at bathroom lavatories by 25 percent. Flow restrictors may also be used on lavatory faucets, giving a savings of about 25 percent. It is estimated that a spray tap can save 50 percent over standard faucets. Spray taps are more commonly found on kitchen sink faucets than bathroom lavatory faucets; however, because of their energy savings potential, they may become more popular. (A maximum temperature control device at the pont of use may also reduce energy consumption by limiting the flow of hot water. Its main purpose, however, is as a safety device to avoid scalds.) Aerators, spray taps, and flow restrictors, though they vary widely in price and type, are all quite cost-effective.

Of course, every effort should be made to avoid leaks, particularly from hot water faucets. A hot water leak not only wastes water, but also the energy required to heat it.

If consumers demand other methods and improved technology in regard to hot water consumption, several possibilities exist for development. One of these is the improved design of tubs, shower stalls, and lavatories. These fixtures could be insulated, made of a material which feels warm and will not absorb or transmit heat, and shaped to fit the body more closely.

Another way to reduce hot water is by mixing hot and cold water at the water heater instead of adjusting the faucet. This can be accomplished by adjusting the valves on the water heater which are set to determine flow rate and temperature.

Research is not underway in the area of waste water reclamation. It may be possible to reclaim the heat from the waste water from tubs, showers, and lavatories, as well as to reclaim the water for flushing toilets.

Following is a list of several tips for saving energy and hot water when bathing:

1. Take short showers instead of baths.

2. Reduce the duration of showers.

3. Fill the lavatory with warm water, rather than allowing it to run when washing or shaving.

4. During winter, allow the water for baths to cool (releasing heat to the bathroom) before draining.

5. Encourage members of your family to bathe one after the other (or together) to take advantage of the warmth of the fixture (and room) from previous use.

6. Avoid drafts near the tub or shower which would encourage the use of a higher water temperature.

7. Check for leaks around fixtures.

Grooming involves the consumption of hot water, electricity, and petroleum products. Although the quantity of energy consumed for one grooming process or beauty product may be small, when many pieces of equipment are involved, or when energy is wasted the costs mount up. The following beauty aids and equipment are commonly used for grooming: electric shavers, electric hair dryers, electric hair curlers and irons, electric toothbrushes, electric water pump tooth-and-gum cleaners, contact lens autoclaves, electric make-up mirrors, electric manicure sets, electric facial misters, and electric shoe buffers/polishers. This does not include the bathroom or dressing area equipment which may be in operation; lights, heaters, ventilators, sun lamps, heat lamps, air conditioners, and dehumidifiers. The popular use of these items, as well as the extravagant use of beauty products (which are petroleum

products for the most part) is an indication of the lack of energy conservation awareness which currently prevails in the United States.

The simplest, most direct way to reduce the energy used for grooming is to limit the use of equipment which requires electricity. Another way to reduce energy consumption is to restrict the use of hot water. Also, a reduction in the quantity of petroleum products will indirectly save energy. The following are tips to aid in saving energy while grooming:

1. When no longer is use, equipment should be turned off, disconnected, and stored (out of reach of young children).

2. Electric equipment should be properly maintained. Check for faulty wiring, dials, thermostats, and seals. Keep equipment clean.

3. Use equipment only when necessary. For example, air dry hair when possible, brush you teeth "by hand," and polish your shoes "by hand."

4. Keep light fixtures clean.

5. Keep exhaust fans and ventilators clean.

6. Avoid overheating the bathroom. An exhaust fan may be used to remove excess heat and moisture from a bathroom more efficiently than by air-conditioning.

7. An electric shaver may be more energy conserving than shaving with a blade if a great deal of hot water is used, not to mention shaving cream.

GLOSSARY

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Active solar system - a space or hot water heating system that depends on energy-consuming equipment (pumps, blowers, electric controls, automatic tracking devices, etc,) to collect or to move the solar heat.

Air conditioning - the process of treating air to control its temperature, humidity, cleanliness, and distribution within a particular space.

Air conditioning filter - material usually made of fiberglass or foam rubber used to collect dust, dirt, grease and other particles and to prevent them from entering mechanical heating and cooling equipment.

Air Exchanges - uncontrolled movement of a volume of air in or out of a room or an entire building over a period of time. Air exchanges (AE) are sometimes expressed as whole-volume exchanges per hour or, alternatively, as cubic feet per minute (CFM). A standard, insulated new home is expected to have 1 AE/hour; a specially constructed, energy-efficient house may have only 1/2 AE/hour. Drafty, uninsulated houses typically have 2 - 4 AE/hour.

Air pollution - a level of concentration of foreign materials in the air that unfavorably affects the life and health of air breathing plants and animals (especially humankind) and/or affects property adversely.

Appliance - any device meant for a specific use, but especially those requiring commercial power input for operation. Common household appliances include refrigerators, stoves, toasters, dishwashers, mixers, irons, washers and dryers, television, and stereo sets.

Atomic energy - energy obtained from disturbances within the nucleus of the atom. The resulting disintegration of matter into energy may be spontaneous (as in natural radioactivity) or it may be induced artificially (as in nuclear fission for production of electricity and in uncontrolled fusion for the firepower of hydrogen bombs).

Attic ventilation - system used to remove heat and moisture from the attic. Example: wind turbines and eave vents without ventilation, heat build up may become excessive. At night, heat may continue to radiate into the rooms or space below. Ventilation is also required to remove damaging moisture from the attic.

Types include:

1. Wind turbines
2. Continuous ridge and soffit vents
3. Gables
4. Power vents

Barrel - a liquid volume equal to 42 gallons of 159 liters. One barrel of crude oil has about the same heat energy as 350 pounds of bituminous coal.

Blackout - a shutoff of all electrical power in a given area. It can be caused by storm damage, equipment failure, or overloaded circuits because of unusually heavy consumer use.

Brownout - the deliberate reduction of power to users of electric utilities whenever demand for power exceeds generating capacity. During a brownout, lights will dim and fans run more slowly. Some appliances stop running altogether.

B.T.U. (British Thermal Unit) - the amount of heat energy required to raise the temperature of one pound of water one degree Fahrenheit. One BTU is approximately equal to the amount of heat given off by a wooden match. A pound of coal contains approximately 13,000 BTU of chemical energy.

Calorie - the amount of heat required to raise the temperature of one ml of water one degree Celsius; a metric unit of heat energy.

Capacity - the maximum load for which a generator, transmission circuit, power plant, or system is designed.

Caulking - a soft, semi-solid material that can be squeezed into non-movable joints and cracks of a building, thereby reducing the flow of air in and out of the building.

Coal - solid fuel formed by the decomposition of plants buried deep under Earth's surface. A whole group of naturally occurring, carbon and hydrogen-rich rocks are called "coal". Various types are ranked by the percentage of carbon in dried samples or by the calorie value of moist ones. Age and depth of burial contributed to differential changes in the original plant debris. The concentration of carbon increased over time (hundreds of millions of years) as trapped moisture and gases eventually escaped and pressure forced changes in the organic remainder.

The chemical composition of coal varies widely. It is not homogeneous and regional differences, reflecting both variations in its history of formation and the kinds of plants involved, are common. However, gross distinctions can be made. From least to most carbon-rich, the coal group includes peat, lignite, sub-bituminous and bituminous coals, and anthracite.

Comfort zone - the ranges of indoor temperatures, humidity, and air movement under which most people enjoy a feeling of well-being.

Condensation - the change in state from a gas to a liquid, releasing energy.

Conduction - the flow of heat from a warm material to a cooler one in direct contact with it; the transmission of energy directly from molecule to molecule.

Conservation - making the best use of natural resources by reducing waste, improving efficiency, and slowing the rate of consumption.

Convection - transfer of heat energy by the movement of currents of a liquid or a gas.

Curtailment - cutting back the use of energy resources as opposed to conserving or wisely using resources.

Damper - a device used to vary or stop the volume of air passing through an air inlet, outlet, or duct, such as a fireplace.

Deciduous trees - trees which lose their leaves in the winter. They allow the sun in during the winter but keep the sun out during the summer.

Degree-day - the difference between 65° and the daily temperature. For example, if the low temperature for Friday was 12°F and the high for the day was 28°F, the number of degree-days for the day was

$$(65°F - \frac{28 + 12°F}{2}) = (65°F - 20°F) = 45$$

The greater the number of degree-days in a particular area, the higher the energy consumption for heating and cooling is likely to be.

Ductwork - if your home has central cooling and/or heating, it will have ductwork. Ductwork is the air delivery system to the rooms. It is most commonly found in the attic or in the furred down (low) areas of the ceiling.

E.E.R. (energy efficiency ratio) - rating used to help the consumer determine and compare the operating costs of heating and cooling equipment. E.E.R. indicates how completely an electrical appliance converts energy at the point of use. The rating is derived by comparing heating or cooling power (output) to energy consumed (input). The higher the rating, the more energy-efficient the equipment (Example E.E.R. of 9.0 would cost less to operate than E.E.R. of 6.5).

$$\frac{\text{BTU per hour (cooling capacity)}}{\text{watts (electrical consumption)}}$$

Efficiency - the ratio of useful work or energy output to total work or energy input. One hundred percent energy efficiency is impossible. There is always a cost or "handling charge" in any energy conversion. In addition, some forms of concentrated energy and some energy-consuming systems provide much more energy than is needed to do a particular task. For example, using a 350 horsepower car to transport one healthy person two miles to a swimming pool or gym for exercise is a highly inefficient use of both the driver and the car. A bicycle would be more efficient according to the standard pioneered by the American Physical Society: "thermodynamic efficiency is the ratio of the least available work that could perform the task to the available work actually consumed in doing the job with a given device or system."

Electric meter - device that measures electricity in kilowatt-hours and has either dials or numbers for recording the amount used.

Energy - the ability to produce motion against resistance (work); or, whatever heats, lights, moves, or changes matter.

Energy audit - the examination of a building's construction and materials, mechanical and electrical systems, energy usage patterns, in order to identify possibilities for energy conservation.

Evaporation - the change from liquid to gas which requires extraordinary absorption of heat by the material undergoing this phase change. Liquid water, for example, absorbs 540 extra calories per gram at 100°C as it vaporizes. This heat will be released again if the water vapor condenses.

Evergreen trees - trees that keep foliage all winter. Coniferous trees are evergreens which make especially good windbreaks.

Fiberglass - a material made of extremely fine filaments of glass which are used in masses as insulation.

Flourescent lamp - a lighting device in which light is produced by the passage of electricity through a metallic gas enclosed in a tube. Flourescent bulbs provide about four times as much illumination per watt as incandescent ones do; they give off about 75% less heat; they cost more initially but they last approximately seven times longer than incandescents; and they include types that can be used in existing incandescent fixtures.

Foot candles - the unit of direct illumination at a given location, equivalent to the energy of light received on a surface at a distance of one foot from a standard candle. It is equal to one lumen per square foot.

Forced air - a common type of heating system in which air heated in a furnace is then blower-driven or "forced" through ducts to all areas of the building. The primary fuel may be coal, fuel oil, natural gas, or wood, but electricity is also needed to power the blower and thermostat.

Fossil fuel - any naturally occurring underground fuel formed by decomposition and/or metamorphosis of the remains of ancient life forms. Coal, crude oil, and natural gas are fossil fuels.

Fuel - any substance used to provide heat energy.

Gasket - rubber, plastic, or metal band used around the door frames of appliances and cars to form a tight seal, reducing energy losses by infiltration.

Geothermal energy - heat trapped in the interior of the Earth is called geothermal energy. Boreholes into the crust show an average temperature increase of 1°C for every 30 meters depth, or about 100°F per mile. Geothermal heat is believed to come from the decay of radioactive materials deep in the Earth as well as some from friction of rock movements, tidal forces, and perhaps other sources. This heat keeps great quantities of buried rock molten and hot. Some of this energy escapes at the surface as hot water. Geothermal energy is available in four forms; dry steam, wet steam, hot rocks, and geopressured hot water.

Greenhouse effect - the warming effect of carbon dioxide and water in the atmosphere acting as a "lid" to slow the escape of heat from the Earth's surface. Molecules of water and carbon dioxide absorb and reradiate back to Earth much of the heat radiated from it.

Heat gain - the amount of heat provided to an enclosed space from all sources, including people, lights, appliances, sunshine, and furnace; a figure used to estimate the size and performance of heating and air conditioning system.

Heat loss - a decrease in the amount of heat contained within an enclosed space, resulting from heat flow through walls, windows, roof, and other building components.

Heat pump - a device that transfers heat from a cooler region to a warmer one (or vice versa) by the expenditure of mechanical or electrical energy. The heat pump operates by alternately evaporating and condensing a refrigerant, or heat transferring fluid, in a closed cycle. It differs from a typical refrigeration unit in that the heat pump can reverse its cycle to provide heat instead of removing it. Heat pumps are both heaters and air-conditioners and, compared to electric resistance elements often used in all-electric homes, they are more efficient.

Hydroelectric plant - an electric power plant in which the turbine-generators are driven by falling water.

Incandescent light - a common lighting device containing a solid filament that glows when electric current is passed through it. The filament's resistance to the current makes it glow with heat. The output of an ordinary incandescent bulb is about 95% heat.

Infiltration - the natural process by which air leaks into or out of a building, especially through cracks around doors, windows, vents, electrical outlets, and any other small openings or breaks in the exterior surface. Wind, significant temperature differences between the interior and exterior, lack of caulking and weatherstripping, numerous windows and vents, and inadequate insulation all contribute to high rates of infiltration.

Insulation - material used in home construction to retard (slow down) the heat loss from a home in the winter and heat gain in summer. Some commonly used materials are fiberglass, cellulose, mineral or rock wool, and styrofoam.

Intermediate peak period - 10 a.m. to 2 p.m. and 6 p.m. to 10 p.m. in GSU service area. A period of moderate use of electricity.

KWH - (kilowatt-hour) - the amount of energy equal to 1000 watts of electricity used for one hour. (Example: Ten 100-watt light bulbs burning for one hour.)

Life cycle cost - the total cost of an article over its entire useful life, including operating, maintenance, and financing expenses in addition to the purchase price.

Megawatt - a unit of power equal to 1,000 kilowatts or 1,000,000 watts. It is usually used to describe the capacity of power plants.

Natural gas - mixture of gaseous hydrocarbons occurring naturally in certain rocks. There are several kinds of gas trapped in porous rocks underground. One of these "natural gases" is methane, used as a commercial fuel. Petroleum deposits always include some methane, but natural gas deposits are not always accompanied by petroleum. Natural gas is commonly sold to individuals in hundreds of cubic feet (Ccf), the unit appearing on household utility bills. One Ccf of commercial methane has about 25,000 Calories, the equivalent of 8 pounds of coal of 0.7 gallons of crude oil.

Natural gas meter - device that has dials like the electric meter, but measures gas consumption in hundreds of cubic feet.

Non-renewable resources - energy resources that are not being replaced during human history. Examples are coal, oil, natural gas, and uranium.

Nuclear power plant - a generating station that converts nuclear energy into some form of useful power, such as mechanical or electrical power. In a nuclear power plant, heat produced by a reactor is generally used to make steam to drive a turbine that, in turn, drives an electric generator.

Nuclear reaction - a change in an atomic nucleus due to fission, fusion, neutron capture, or radioactive decay, as distinguished from a chemical reaction which is limited to changes in electron structure surrounding the nucleus.

Off-peak period - when demand for electricity is the least. 10 p.m. to 10 a.m. on weekdays and all weekend in GSU service area. (On weekends, industries do not need as much electricity and businesses are closed.)

Overhang - a solid horizontal projection on the exterior of a building placed (ideally) so that it shades southern windows in summer only. An overhang may be fixed or movable, part of the original construction or a retrofit. Several designs are possible. An upward-tilted overhang can also serve as a reflector in winter.

Passive solar system - Building design, materials, and equipment that together deliver 50 times more heat to the interior of a building than does the non-renewable supplementary energy it uses. Passive systems rely on natural energy flows, collection, and storage with a minimum of mechanical aids and a minimal use of fossil fuels.

Payback period - the amount of time it takes for an energy-saving improvement to pay for itself through savings on the utility bill. If adding R-30 insulation to a home with R-0 insulation costs $500 and you save $250 a year on your utility bill, it would pay for itself in 2 years.

$$\frac{\$500 \text{ (cost for insulation)}}{\$250 \text{ (yearly savings)}}$$

Peak period - Time of day when the greatest demand for electricity occurs (2 - 6 p.m., Monday through Friday).

Petroleum - a naturally occurring, oily, dark-colored liquid mixture of hydrocarbons. Refineries distill this raw material into gasoline, kerosene, diesel fuel, lubricating oil, waxes, and other products.

R-Value - the resistance to heat flow. The higher the R-value, the greater the insulating efficiency of the material. Thickness is a factor also, so R-values are commonly stated per inch of building material. R-values are additive--thicker material or a combination of materials means increased resistance to heat flow. Some typical R-values per inch of material are 6.25 for polyurethane foam; 3.17 for fiberglass batts; 1.25 for fir and pine wood; 0.18 for plaster; and 0.08 for concrete.

Radiation - emission and propagation of energy through space; pure energy that travels rapidly until striking materials that can absorb it. Then absorbed radiation will either induce a chemical change (as in photosynthesis, sun tanning, photography, photovoltaic cells) or increase the random motion of the molecules of the material contributing to its temperature. Examples of bodies emitting radiation are the sun, electric lights, human beings, waters and cements that are warmer than their surroundings, Franklin stoves, and radioactive materials.

Reclamation - Process of replacing the soil, clay, and rocks removed earlier to expose coal or oil shale for strip mining; compacting and leveling the site; and replanting it to restore its appearance and reduce erosion and drainage of waste materials.

Renewable resources - materials that are recycled by natural proccesses within a relatively brief span of time (a human lifetime). Fresh water, wind, sunshine, and trees are some examples of resources that seem to renew themselves within human time frames.

Retrofit - add energy-saving features to an existing home.

Site orientation - the relationship of a home's or building's position to prevailing winds, sun, vegetation, and other buildings, which can affect the heat loss or heat gain performance of the home or building. Example: locating a home so that most of the windows are facing north and south in order to minimize heat gain in the summer.

Solar cell - a thin sheet of semi-metallic material (usually silicon) which can convert energy from the Sun directly into electricity. An individual cell on the retail market in 1980 typically produces a small potential difference of about 0.5 volts and about 0.6 watts of power. An array of solar cells can provide a useful electrical capacity.

Solar collector - a device which collects the Sun's energy as heat. They are made in many shapes and styles: flat-plate, tubular, and concentrating. Air or liquids are the fluid media usually used for heat transfer.

Solar energy - electromagnetic radiation emitted by the nearest star, the Sun. Earth receives about 4.2 quadrillion kilowatt-hours of energy per day from the Sun.

Storm window - a glass or plastic covering for a conventional window, used to provide additional protection from cold and wind. A well-sealed storm window traps an insulating layer of air between itself and the other window, decreasig heat loss due to conduction through the glass and keeping the inside pane warmer.

Strip-mining - a method of mining coal that lies less than 110 feet below the surface. Overburden (soil, clay, and rock, above the fuel) is scraped away by huge mechanical shovels and stored, layer by layer, in separate piles. The coal is removed and then (ideally) layers of overburden are replaced in their former relative positions, topsoil uppermost.

Thermostat - a temperature-sensitive device which turns heating and cooling equipment on and off at set temperatures.

Ton of air conditioning - the thermal refrigeration energy required to melt one ton of ice (2,000 pounds). As a means of expressing cooling capacity, 1 ton = 12,000 BTU/hour cooling.

Vapor barrier - a material used to prevent moisture from passing through warm interior walls of a building and condensing on the cold exterior walls, thus soaking insulation and causing other problems. Plastic sheeting is often sealed against wall studs as a vapor barrier; special backing on batt and blanket insulation, foil or plastic wall coverings and special interior paints are other vapor barriers used to keep humidity inside a building.

Watt - a measure of electrical power. Wattage is a product of the voltage (measure of the "pressure" in an electrical circuit) and the amperes (current or flow of electricity). One volt and one amp applied to a circuit for one hour would use one watt-hour of electricity.

Weather stripping - foam, metal, felt, or rubber strips used to form a seal around windows, doors, vents, and other movable openings where infiltration can occur.

Wind break - a dense row of trees, or a fence or other barrier that interrupts and changes the local path of the wind.